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Volume IX DECEMBER, 1927 Number 12

THE JOURNAL OF INDUSTRIAL HYGIENE

AND ABSTRACT OF THE LITERATURE

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Published Monthly at Mount Royal and Guilford Aves., Baltimore, Md.
by HARVARD SCHOOL OF PUBLIC HEALTH

Entered as second-class matter, at the Post Office at Baltimore, Maryland, under Act of March 3, 1879. Published Monthly.
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THE JOURNAL OF INDUSTRIAL HYGIENE

PUBLISHED MONTHLY

VOLUME IX DECEMBER, 1927 NUMBER 12

THE OZONE FALLACY IN GARAGE VENTILATION*

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OZONE generators have been installed in a number of commercial garages and service stations on the theory that the ozone which they give off will convert the deadly carbon monoxide gas from the exhaust of gasoline engines into the comparatively harmless carbon dioxide.

Two chemical reactions are suggested to express the supposed action of the ozone on the carbon monoxide as follows:

$$CO + O_3 = CO_2 + O_2$$
$$3\,CO + O_3 = 3\,CO_2$$

The second reaction is suggested by one theory of the internal structure of the ozone molecule, not by published reports of actual laboratory measurements on the products of the reaction. From the point of view of the application of ozone in garage ventilation, the second reaction obviously expresses a more efficient use of the ozone, since a given quantity of ozone is shown to oxidize three times as much carbon monoxide as in the first reaction.

But do either of these reactions actually take place? Will ozone actually oxidize carbon monoxide? The chemists who have investigated the reaction do not agree. If there is any reaction at all it is so slow and ill defined that some deny its existence. Others have found evidence of a partial reaction. A careful review of the work of these chemists leads us to the conclusion that ozone oxidizes carbon monoxide at a rate so slow that it is probably of no use in garage ventilation for the purpose of destroying carbon monoxide. The exhaust gas from the motors would be removed from the room by ordinary diffusion through doors and windows at a faster rate than the ozone could oxidize it.

* Received for publication Sept. 16, 1927.

Although we do not know of a logical reason to support the use of ozone in garage ventilation, it must be admitted that ozonators have in some cases met with a favorable reception. Some of the proprietors and employees where ozone generators have been installed are enthusiastic about them. The men say that they feel better and are less subject to the carbon monoxide headache. They apparently have more energy to go through with the day's work. It is said that there is less smoky haze in those rooms where the ozone machines are in operation.

Because it was not possible to condemn these machines without qualification, and because an unwarranted dependence on them might create a false sense of security to such a degree that windows and doors might be tightly closed in cold weather, the Bureau of Industrial Hygiene of the New York State Department of Labor has made an investigation to determine whether or not an ozone generator shall be considered as the partial equivalent of the garage ventilation that is specified in the labor law. A thorough review of the scientific literature was made, and experiments were conducted in the laboratory of the Bureau of Industrial Hygiene.

Early Experiments

Most of the early experiments on the reaction between ozone and carbon monoxide were conducted for the purpose of revealing something of the internal structure of the carbon monoxide molecule, whether it should be considered a saturated or an unsaturated compound, and how the valence relations should best be expressed.

Leeds (1) stated that ozone oxidizes carbon monoxide. A mixture of 2,500 c.c. of carbon monoxide, 2,500 c.c. of air, and 0.04 mg. of ozone (made by contact of the air with moist phosphorus) was allowed to stand eighteen hours in a closed bottle; the carbon dioxide was then estimated by absorption in barium hydroxide solution, decomposition of the barium carbonate thus formed, and weighing of the carbon dioxide. It was found that 14 mg. of carbon dioxide had been formed. In other words, 6.9 c.c. of carbon dioxide had been formed from 2,500 c.c. of carbon monoxide. Therefore about 0.25 per cent. of the carbon monoxide had been oxidized to carbon dioxide in eighteen hours.

Baumann (2) confirmed these results by passing a mixture of air and carbon monoxide over moist phosphorus, getting a turbidity in barium hydroxide in a few hours. In one experiment a mixture of 30 liters of air and 2.45 liters of carbon monoxide was passed through moist phosphorus for twelve hours, the weight of carbon dioxide obtained being 0.0646 gm., representing the oxidation of 1.3 per cent. of the carbon monoxide.

Franklin (3) showed by means of two series of experiments (see Table 1) that ozonized air oxidizes carbon monoxide. In one series, measured quantities of carbon monoxide were mixed with ozonized air in bottles and were allowed to stand overnight. Then acid ferrous sulphate solution was added to decompose the excess ozone, and the residual gas was aspirated through barium hydroxide solution, the barium carbonate precipitate thus formed being titrated with standard oxalic acid solution. The

second series of experiments (bottles 4 to 6, inclusive) was made in the same way except that the bottles were allowed to stand three days instead of overnight. The small amounts of carbon dioxide in experiments 3 and 6 were explained as being apparently introduced through inefficient washing of the air used in aspiration.

TABLE 1.—REACTION BETWEEN OZONIZED AIR AND CARBON MONOXIDE, ACCORDING TO FRANKLIN (3)

BOTTLE NUMBER	CARBON MONOXIDE	CARBON DIOXIDE
	c.c.	*c.c.*
1	25	10.7
2	50	4.0
3	0	0.4
4	10	8.7
5	25	17.1
6	0	1.8

On the basis of these experiments Franklin concludes that "These experiments demonstrate conclusively that carbon monoxide is oxidized to carbon dioxide by simple contact with ozonized air."

On the other hand Remsen and Southworth (4) assert positively that carbon monoxide is not oxidized by ozone. Carefully purified carbon monoxide was mixed with oxygen which had been ozonized in a Wright generator connected with a Holtz electrical machine, and the mixture was passed continuously into limewater for several hours. The limewater remained clear, thus proving the absence of carbon dioxide. Heating the mixture of ozone and carbon monoxide to 300° before passing into the limewater did not change the results (5).

Remsen and Keiser (5) found in repeating Leeds' and Baumann's experiments that carbon dioxide would appear in the barium hydroxide solution even though no carbon monoxide at all was passed into the apparatus; the carbon dioxide apparently being formed by the action of the ozone on the cork stoppers, on the oily substances in the cotton wool, on the dust in the large volume of air used, or on the carbon impurities in the phosphorus. It certainly did not come from the carbon monoxide.

It should be noted at this point that both sides of the contest that was being waged over the molecular structure of ozone and carbon monoxide were in agreement in that there was no extensive and immediate reaction between ozone and carbon monoxide.

Jones (6) passed pure air and carbon monoxide over carefully purified phosphorus, taking every precaution to exclude the possibility of contact of the ozone with organic matter or mercury, and always found carbon dioxide in the barium hydroxide absorbing solution. In these experiments 5 to 10 liters of air containing 15 to 30 per cent. of carbon monoxide were run for six to twelve hours through an apparatus specially constructed with all sealed glass joints. A blank experiment with air alone failed to give a trace of precipitate in the barium hydroxide solution. Another series of experiments with strong ozone made with an electric ozonizer showed that the oxidizing power of ozone varies with the temperature and the concentration. The percentage of ozone in air passing over moist phosphorus was determined to be 0.0021, the ozonizer giving 3.78 per cent. The action of

ozone on carbon monoxide at room temperature is appreciable if the concentration of the ozone be high.

Waters (7) working under Remsen repeated Jones' experiments using a Holtz machine instead of an induction coil. The latter gave much better results because damp weather interfered with the Holtz machine, sometimes decreasing the percentage of ozone to practically nothing. One experiment when the machine was working at maximum efficiency gave 0.95 per cent. of ozone. From a series of experiments it was concluded that "although ozone does not act on carbon monoxide as readily as we should expect from its apparent unsaturation, still it does cause some oxidation to carbon dioxide, depending on the amount of ozone present in the oxygen. And, further, the oxidation does not take place to an appreciable extent at the ordinary temperature."

Andrews and Tait (8) called attention to the fact that when the silent discharge acts on carbon monoxide alone some carbon dioxide is formed.

Leeds observed that carbon dioxide is formed when a mixture of carbon monoxide and oxygen is acted upon by the silent electric discharge.

Berthelot (9) reported that there is a kind of equilibrium between ozone and carbon monoxide since a mixture of the two gases in the brush discharge forms about 90 per cent. of carbon dioxide, while carbon dioxide is partially decomposed under similar conditions into carbon monoxide and ozone.

Goldstein (10) found that when sparks were passed through a Geissler tube filled with oxygen and carbon monoxide, at the temperature of liquid air, the spectrum of carbon monoxide gradually disappeared.

Koetschau (11) found that ozone reacts with carbon monoxide in aliphatic organic combination to form in general the organic peroxide, sometimes carbon dioxide.

Manchot and Kampschulte (12) found that ozone is decomposed by mercury and other metals, a fact that may well be kept in mind when interpreting the results of experiments on the oxidation of carbon monoxide with ozone.

Clausmann (13) exposed to sunlight for eight days equal volumes of carbon monoxide and ozonized oxygen containing the very high concentration of 200 mg. of ozone per liter, absorbed the product in barium hydroxide, and found that 2.83 parts of carbon dioxide had been formed from 100 parts of carbon monoxide. The same experiment repeated in darkness gave only 0.88 part of carbon dioxide. A trace of moisture accelerates the oxidation in sunlight.

Thiele (14) exposed a mixture of 32.4 per cent. of oxygen, 64.5 per cent. of carbon monoxide, and 3.1 per cent. of nitrogen to ultraviolet radiations and obtained a mixture of 2.4 per cent. of carbon dioxide, 30.9 per cent. of oxygen, 61.8 per cent. of carbon monoxide, and 4.8 per cent. of nitrogen.

Ray and Anderegg (15) during the war time search for means to remove the toxic gas, carbon monoxide, from the air showed that, when dilute mixtures of this gas and air are passed slowly through the silent discharge, while oxidation takes place it is by no means complete. In one experiment air containing 1 per cent. of carbon

monoxide was passed through the ozonizer at a rate of 9 liters per hour. The effluent gas contained 0.19 per cent. of carbon monoxide and 0.54 per cent. of ozone. In another experiment air containing 1 per cent. of carbon monoxide was passed through the ozonizer at a rate of 2.73 liters per hour. The effluent gas contained 0.17 per cent. of carbon monoxide and 0.002 per cent. of ozone. Even though the impure air had been passed through a powerful ozonizer at a very slow rate, it contained highly toxic concentrations of both carbon monoxide and ozone. The ozone can be removed by contact with a silver catalyst and decomposing ozone causes a further oxidation of the carbon monoxide; therefore under very carefully controlled conditions it is possible to obtain an effluent gas that is free from ozone and contains almost no carbon monoxide. Obviously these conditions could not be realized in commercial practice; and the only logical conclusion is that no appreciable oxidation of carbon monoxide present in small amounts in air or oxygen is effected by a low concentration of ozone unless the ozone is decomposed by special catalysts.

Tests in Experimental Chamber

The published data pertaining to the ozone-carbon monoxide reaction seemed to present a strong case against the use of ozone in ventilation for the purpose of destroying carbon monoxide. But it must be admitted that none of the published data mentioned the specific problem of garage ventilation. All of these experiments had been conducted with some other object in view. Because of this fact the Bureau of Industrial Hygiene decided to conduct a series of experiments in which the garage atmospheric conditions would be simulated as closely as possible.

A 10-cu. m. gas chamber (Fig. 1) was fitted with glass tubes for withdrawing air samples and for conducting carbon monoxide into the chamber. An 18-inch circulating fan and a 1.92-gm. per minute ozonator were placed in the chamber and were so connected that both could be started or stopped without entering the chamber.

The chamber was closed and leakage of air around the door was stopped as completely as possible. Illuminating gas containing 30 per cent. of carbon monoxide was conducted into the chamber and mixed by means of the circulating fan until it contained about thirteen parts of carbon monoxide per 10,000 of air. The supply of carbon monoxide was then stopped and air samples were withdrawn at ten-minute intervals by means of a glass tube and a centrifugal air pump.

The air samples were analyzed by the Sayers-Yant pyrotannic acid method using a blood reagent made by diluting 6 c.c. of defibrinated steer's blood to 20 c.c. with saturated borax solution, then diluting it to 120 c.c. with water.

When three samples had been withdrawn, the ozonator was started and sampling continued at ten-minute intervals. The results are shown by the curve in Figure 2. The first three tests show a constant slow reduction in the concentration of carbon monoxide due to leakage out of the gas chamber. If there were a prompt and appreciable reaction of ozone with carbon monoxide the curve would turn

downward immediately after the ozonator was started, for there was enough ozone discharged in the room in three minutes to react with all of the carbon monoxide in the chamber.

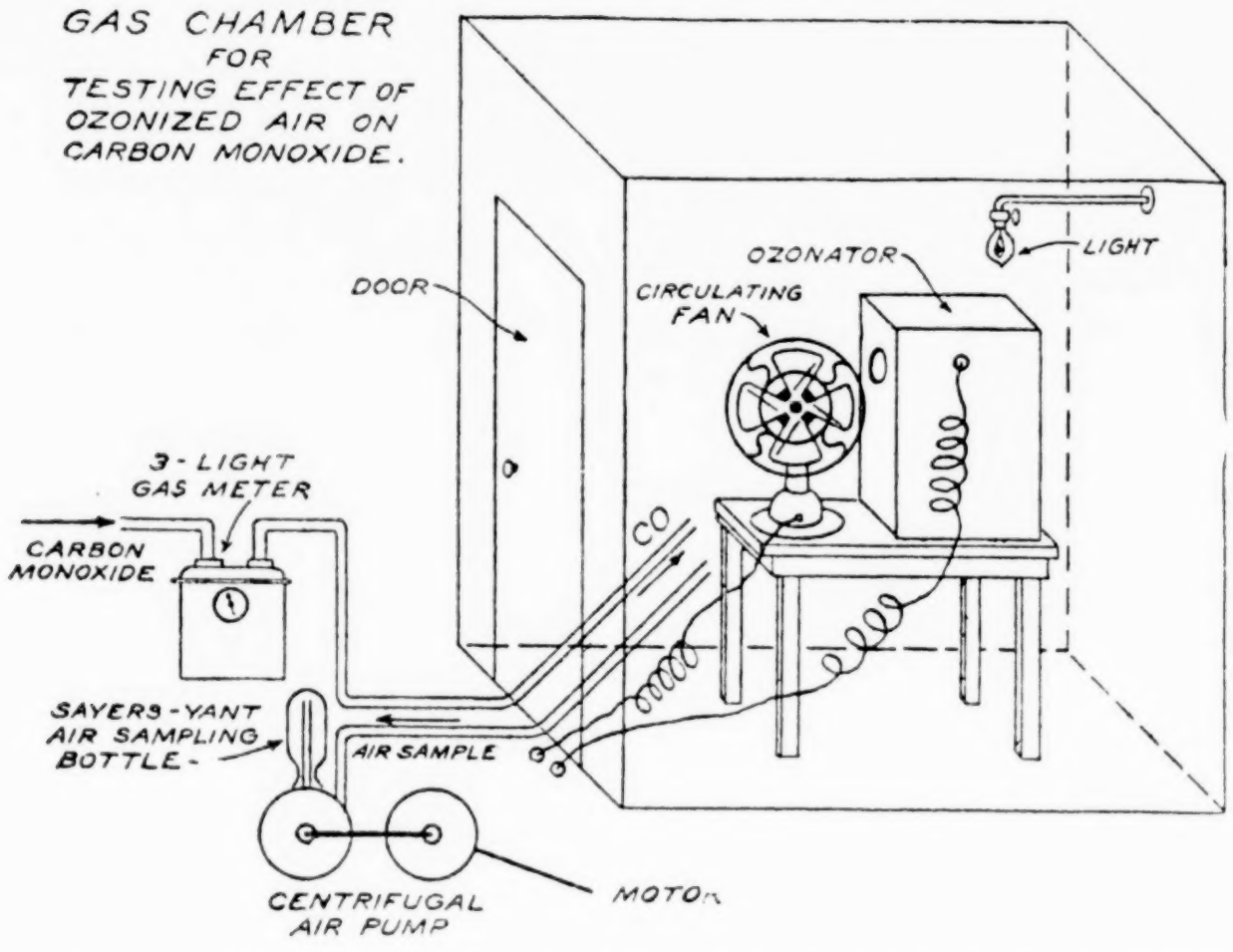

FIG. 1.—Gas chamber for testing effect of ozonized air on carbon monoxide.

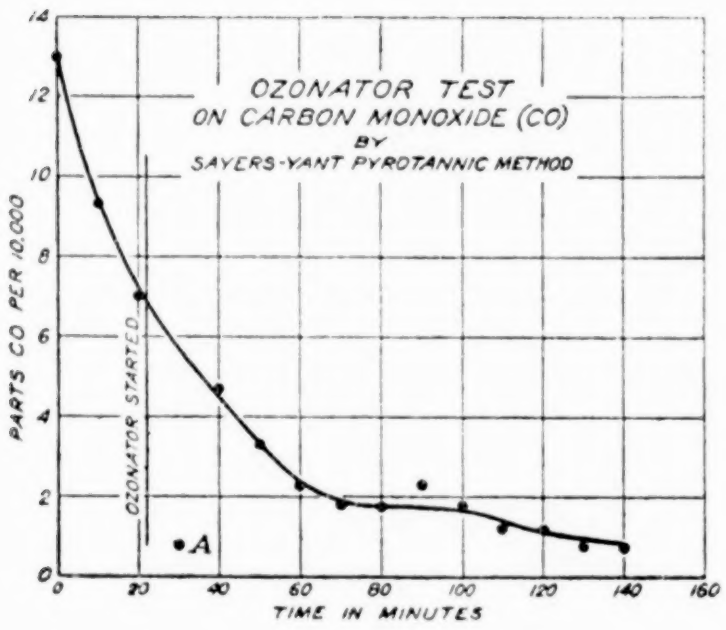

FIG. 2.—Ozonator test on carbon monoxide by Sayers-Yant pyrotannic method.

The first sample after starting the ozonator was taken by mistake from the laboratory atmosphere outside the gas chamber. The sampling tube had been accidentally disconnected. That sample, indicated by point A in Figure 2, contained almost no carbon monoxide; a result which, had there been no accident, would have indicated that the ozonator was perfectly efficient.

But the next sample contained 4.7 parts of carbon monoxide per 10,000 of air; and the following eight samples taken over a period of eighty minutes all showed definite amounts of carbon monoxide, the actual concentration gradually decreasing because of diffusion from the gas chamber at the same rate as before starting the ozonator. It will be noted that the shape of the curve was not changed by starting the ozonator. The curve is not a straight line because increasingly large quantities of air are required to effect

the same ratio of dilution as the concentration of carbon monoxide becomes smaller.

These results agree with the experiments of Franklin and others, for they showed that the reaction between ozone and carbon monoxide at room temperature is very slow, a period of more than three days being required for complete reaction.

In order further to confirm our results, tests were made of the atmosphere in service stations where ozonators were in operation. As was expected, appreciable amounts of carbon monoxide were found, and in two automobile repair shops quantities as high as three and four parts per 10,000 were found.

Even though carbon monoxide were promptly destroyed by ozone, a simple calculation shows that four ozonators would be required to destroy the carbon monoxide from each motor in operation. In this calculation every assumption is made that is favorable to the ozonator—*i.e.*, the 3:1 combining proportion in which each atom of ozone is active; motor operating only two hours a day while the ozonator is operating eight hours; 1.5 cubic feet of carbon monoxide per minute per motor; and 1.92 gm. of ozone per minute from the ozonator.

Then again it is known that ozone is more poisonous than carbon monoxide. Hill and Flack (16) investigated the physiologic influence of ozone and determined the lethal dose for small animals exposed two hours to be fifteen to twenty parts per million. They state that lower concentrations undoubtedly would have a fatal effect if breathed for a much longer period.

They found the cause of death by ozone to be an acute inflammation of the respiratory tract, the lungs becoming intensely congested and edematous. Microscopically the pulmonary alveoli appear full of an inflammatory exudation. Many of the alveoli are full of blood, for so intense is the irritant effect that hemorrhages take place.

These authors observed that, in a concentration of two or three parts per million, men find that ozone is inclined to irritate the respiratory tract and has a tendency to produce headache and oppression. If ozone is used in a ventilating system it should be in such concentration as is scarcely perceptible to a keen sense of smell—that is, less than one part in a million.

Ozone has a most potent action as a deodorizer. The masking or destruction of smells has been sufficiently demonstrated. Ozone relieves the disagreeable quality of the air. It seems to give a certain tang to the air, and, by stimulating nerve endings in the respiratory tract, relieves the monotony of overwarm and close air.

Hill and Flack found that a large concentration of ozone in the air depresses the respiratory metabolism, resembling pneumonia in this respect. High pressures of oxygen produce inflammation of the lung similar to that produced by ozone. It will be of especial interest therefore, in further research, to see whether or not the effect of ozone is due to an increase of the oxygen partial pressure of the blood. Then we may know whether ozone has any value for the treatment of carbon monoxide poisoning.

Even though the maximum recommended concentration of five parts per million of ozone were installed,

that concentration could not react with more than fifteen parts of carbon monoxide; and it is well known that at least three times this quantity of carbon monoxide can easily be tolerated.

In view of these facts it is difficult to explain the very beneficial results reported by some employees and proprietors. The psychologic effect of a preventive measure that they can see and smell may have something to do with it. If there is any real physiologic effect of the ozone which balances the effect of the carbon monoxide within the human body, that effect is yet a mystery which future medical research must solve. Ozone has been recommended in the practice of medicine for a variety of ailments, achieving apparently a degree of success in some cases, and it is just possible that future research will show that ozone is a valuable treatment for carbon monoxide poisoning.

But from the practical viewpoint it is far better to remove a poisonous gas by adequate ventilation than to depend on the inhalation of a still more poisonous gas in the hope of bringing about a problematic physiologic reaction.

In conclusion, therefore, it is recommended that, when a positive test by the Sayers-Yant method is obtained, the carbon monoxide hazard be eliminated by compliance with the letter of the following Code Rule 719 which is enforced as a part of the labor law in New York State:

> Every workroom in which carbon monoxide is emitted or created in or in connection with any process of manufacture shall be provided with such ventilation that the carbon monoxide shall not exceed one-half part in ten thousand volumes of air in any occupied part of such workroom.

Summary

The ozone generators that have been installed in a number of commercial garages and service stations do not convert carbon monoxide into carbon dioxide at a rate that is fast enough, or in proportion that is complete enough, to be of any practical use for the removal of carbon monoxide gas from the atmosphere. It is far better and more effective to open a few windows and permit the removal of the carbon monoxide by the process of natural diffusion; or, if a Sayers-Yant test is positive, to install mechanical ventilation.

A suggestion has been made that ozone may be useful in the treatment of carbon monoxide poisoning, but its value for this purpose has not yet been proved; and it is not recommended that a gas considerably more poisonous than carbon monoxide be used to obtain a problematic physiologic advantage, when the installation of better ventilation is a safe and sure remedy.

Experiments on known concentrations of carbon monoxide in a small room in which an ozonator was in operation while air samples were withdrawn at regular intervals for analysis by the Sayers-Yant method showed no evidence of an appreciable action of the ozone on the carbon monoxide. The reaction is slow and far from complete even after several days' exposure.

BIBLIOGRAPHY

1. Leeds, A. R.: Oxidation of Carbonic Oxide by Air over Phosphorus at Ordinary Temperatures. Jour. Am. Chem. Soc., 1879, *1*, 232.
2. Baumann, E.: Zur Kenntniss des aktiven Sauerstoffs. Ztschr. f. physiol. Chem., 1881, *5*, 244; Ber. d. deutsch. chem. Gesellsch., 1883, *16*, 2146.
3. Franklin, M. W.: Ozone in Ventilation. Tr. Fourth Internat. Congress School Hyg., 1914, *2*, 346.
4. Remsen, I., and Southworth, M. S.: Ueber die Einwirkung von Ozon auf Kohlenoxyd. Ber. d. deutsch. chem. Gesellsch., 1875, *8*, 1414.
   Remsen, I., and Southworth, M. S.: On the Action of Ozone on Carbon Monoxide. Am. Jour. Science, 1876, *11*, 136.
5. Remsen, I.: On the Transformation of Ozone into Oxygen by Heat. Am. Chem. Jour., 1882–1883, *4*, 50.
   Remsen, I., and Keiser, E. H.: On the Conduct of Moist Phosphorus and Air towards Carbon Monoxide. *Ibid.*, p. 454; *ibid.*, 1883–1884, *5*, 424.
6. Jones, W. A.: The Action of Ozone, Hydrogen Peroxide, etc., on Carbon Monoxide. *Ibid.*, 1903, *30*, 40.
7. Waters, C. E.: The Action of Ozone on Carbon Monoxide. *Ibid.*, p. 50.
8. Andrews, T., and Tait, P. G.: On the Volumetric Relations of Ozone, and the Action of the Electrical Discharge on Oxygen and Other Gases. Phil. Tr. Roy. Soc. London, 1860, *150*, 113.
9. Berthelot, M.: Recherches sur l'ozone et sur l'effluve électrique. Compt. rend. Acad. d. sc., 1879, *88*, 50; Ann. de chim. et phys., 1879, *17*, 142.
10. Goldstein, E.: Ueber Ozonbildung. Ber. d. deutsch. chem. Gesellsch., 1903, *36*, 3042.
11. Koetschau, R.: Über das Verhalten der gesättigten aliphatischen Aldehyde gegen Ozon. Ann. d. Chem., 1910, *374*, 321.
12. Manchot, W., and Kampschulte, W.: Über die Einwirkung von Ozon auf metallisches Silber und Quecksilber. Ber. d. deutsch. chem. Gesellsch., 1907, *40*, 2891.
    Manchot, W.: Über die Einwirkung von Ozon auf Metalle und die Ursache der Passivität. *Ibid.*, 1909, *42*, 3942.
13. Clausmann, P.: Action de l'ozone sur l'oxyde de carbone. Compt. rend. Acad. d. sc., 1910, *150*, 1332; Bull. Soc. chim., 1910, *7*, 827.
14. Thiele, H.: Einige Reaktionen im ultravioletten Lichte. Ztschr. f. angew. Chem., 1909, *22*, 2472.
15. Ray, A. B., and Anderegg, F. O.: The Oxidation of Carbon Monoxide by Passage with Oxygen or Air through the Silent Discharge and over Ozone Decomposing Catalysts. Jour. Am. Chem. Soc., 1921, *43*, 967.
16. Hill, L., and Flack, M.: The Physiological Influence of Ozone. Ann. Rep. Smithsonian Inst. 1911, p. 617; Proc. Roy. Soc. London, Series B., 1911–1912, *84*, 404.

THE DEGREE OF NICOTINE ACTION ON THE WORKMAN'S ORGANISM FROM INHALED TOBACCO DUST*

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IN WORK with tobacco, such as drying and packing it in rolls, assorting, mixing, cutting, rubbing (shaking), and filling cigarettes, a considerable amount of tobacco dust is produced and spread about in the air. From the point of view of industrial hygiene, therefore, the question of the degree of nicotine action on the workman's organism from inhaled tobacco dust is undoubtedly of great interest.

The works of several authors (Kissling, Löwenthal, Thoms, Habermann, Pontag, K. B. Lehmann, and others) have thoroughly described the composition of tobacco smoke and the quantity of nicotine absorbed during smoking, but the question bearing on the nicotine action on the human body from inhaled tobacco dust has not till now been experimentally investigated.

What are the data needed to be able to answer this question? We must know (1) the quantity of tobacco dust inhaled by a workman; (2) how the inhaled dust is distributed in the body; (3) how much nicotine is present in the dust; and (4) what amount of the nicotine is alkalized by the different juices of the human body. It must be taken into consideration that nicotine alkalized from tobacco dust penetrates wholly and easily into the blood through the mucous membranes.

In order to study the foregoing questions, I undertook investigations in the First State Tobacco Factory in Odessa, one of the largest tobacco factories of the Ukraine, where they use chiefly tobacco from Caucasus and Crimea, belonging to the species *Nicotiana tabacum L.* In order to determine the average quantity of tobacco dust inhaled by a factory worker, I used the same procedure which I described in *Gigiena Truda* in 1926 (1). The results obtained from the analysis are presented in Table 1 in terms of dust coefficient and quantity of dust inhaled in the course of a workday. By the term dust coefficient of a workroom I mean the quantity of dust, expressed in milligrams, inhaled by a workman during one hour in the workroom specified.

It should be noted that by repeated investigations in the same workrooms lower dust coefficients were obtained during the morning hours than during the afternoon hours and at the end of the working day; and that lower coefficients were obtained with better grades of tobacco than with inferior grades, and with well-moistened tobacco than with slightly moistened tobacco.

* Received for publication June 6, 1927.

Data published by Lehmann and his pupils (2) show that 10 per cent. of the dust inhaled by man is exhaled; that on an average 50 per cent. remains in the mucous membrane of the nose; and that about 40 per cent. penetrates into the lungs. Under the experimental conditions a small quantity of dust (from 3.2 to 15 per cent.) was kept back in the mouth. With normal nose breathing dust very rarely reaches the mouth. After entering the nose, dust may later be swallowed with mucus and thus may reach the stomach and the intestinal tract; dust which has penetrated into the lungs may also reach the intestinal tract by coughing and swallowing of phlegm. In experiments on animals Saito (3), a pupil of Lehmann's, found that the gastro-intestinal tract is able to retain large quantities of dust—an average of about 80 per cent.

TABLE 1.—AVERAGE AMOUNT OF TOBACCO DUST INHALED BY A WORKMAN IN A TOBACCO FACTORY

PROCESS	SOURCE OF SAMPLE	NUMBER OF SAMPLES	AVERAGE DUST COEFFICIENT[1]	TOTAL DUST INHALED BY WORKMAN DURING AN 8-HOUR WORKDAY
			mg.	*mg.*
Sorting	at sorting	3	6.6	52.8
Sorting	at pinching	7	8.4	67.2
Sorting	at mixing	2	16.6	132.8
Cutting	at stands	6	4.9	39.2
Rubbing	at shaking machine	4	17.3	138.4
Filling cigarettes	at stands	10	2.8	22.4

[1] Quantity of dust inhaled by a workman during one hour in the workroom specified.

TABLE 2.—DISTRIBUTION OF INHALED TOBACCO DUST IN WORKMAN'S BODY

PROCESS	SOURCE OF SAMPLE	QUANTITY OF DUST FOR 24 HOURS			
		Breathed Out	Retained in Nose	Penetrating into Lungs	Capable of Reaching Gastro-Intestinal Tract
		mg.	*mg.*	*mg.*	*mg.*
Sorting	at sorting	5.28	26.4	21.12	42.24
Sorting	at pinching	6.72	33.6	26.88	53.76
Sorting	at mixing	13.28	66.4	53.12	106.24
Cutting	at stands	3.92	19.6	15.68	31.36
Rubbing	at stands	13.84	69.2	55.36	110.72
Filling cigarettes	at stands	2.24	11.2	8.96	17.92

Taking as a basis the data in Table 1

and the distribution of dust in the workman's body, we obtain the averages presented in Table 2.

I shall now consider the degree of nicotine alkalization by different juices of the human body.

According to Anselmino's (4) experiments with fermented tobacco, only about a quarter (6 to 25 per cent.) of the total nicotine content is in combined form (chiefly with citric and malic acids); the remaining nicotine (94 to 75 per cent.) is in free form. Repeating Anselmino's experiments on tobacco dust pertinent to my study, I found 48 per cent. of the total nicotine content in combined state and 52 per cent. of it in free state.

For investigating nicotine in tobacco dust I used Keller's method (5). In order to determine the total amount of nicotine, the tobacco dust was treated first with 20 per cent. potassium hydroxide and then with ether. For the determination of nicotine in free condition, the preliminary treatment with alkali was omitted, the combined nicotine in the form of salts thus being left in the dust.

Comparing my data with those of Anselmino, it is clear that I obtained a smaller quantity of free nicotine and a larger quantity of combined nicotine. One explanation of this may be the fact that I used in my investigations relatively freshly cut tobacco, which is richer in combined nicotine and poorer in free nicotine than tobacco which has been in storage longer; whereas Anselmino may have employed tobacco that had been in storage longer. Another explanation may be the possibility that tobacco dust spread in the air may have lost part of its free nicotine and thus may be relatively richer in combined nicotine.

Inasmuch as I found in the tobacco dust which I examined free nicotine amounting to 52 per cent., and since free nicotine is easily soluble in alkalies and acidulated aqueous solutions, it can be stated *a priori* that the body juices would very actively alkalize the nicotine.

Simulating the conditions in the human body, I submitted tobacco dust to treatment with different juices, putting the mixtures obtained in a thermostat at 37°C. For 6 gm. of dust I employed generally 60 c.c. of juice, which gave a ratio of 1:10.

In the body the relation of the dust inhaled to the quantity of this or that juice is most certainly expressed in a smaller fraction than $\frac{1}{10}$, but this fact has no influence whatever, since the above-mentioned experimental conditions are efficient for alkalization of nicotine, as the ratio taken has proved to be very adaptable for further chemical experiments.

Mixtures of tobacco dust with gastric and intestinal juices were shaken from time to time because the contents of the alimentary tract are never at rest. Having kept the mixture a certain length of time in the thermostat, I filtered it through a folded filter; for saliva this was done by means of a Büchner funnel with low pressure; the residue on the filter was washed out two or three times with warm water in small portions and the nicotine was determined both in the filtrate and on the filter, which was included in the treatment since its presence could not affect the results.

Knowing beforehand the quantity of nicotine in the tobacco dust, I was

able to estimate for each experiment the quantity of nicotine dissolved and alkalized, and thus was able to control the results obtained for each individual case. This time I again employed Keller's method, which proved most convenient and gave fairly satisfactory results for the determination of the nicotine in the solid residue; for the determination of the nicotine in the liquid residue (filtrate), however, it was necessary to verify the accuracy of the results obtained. For this purpose I prepared an aqueous solution of nicotine of known concentration and then proceeded to determine the quantity of nicotine in separate portions, (1) using Keller's method; (2) using Lehmann's method, by steam distillation and following the titration of the distillate with N/10 sulphuric acid using rosolic acid as the indicator; and (3) by extraction of nicotine from solution with Kraut's (6) J.B.K. reagent. Keller's method also proved most adaptable for liquids, and gave satisfactory results. It should be noted that the amount of liquid must be approximately one-half the amount of ether; otherwise an emulsion might arise, preventing the further course of analysis.

After keeping tobacco dust in physiologic salt solution treated with carbonic anhydride[1] I was able in an hour's time to obtain 51 per cent. of the nicotine in the filtrate. In repeated experiments, when the mixture remained in the thermostat for a longer period of time, the increase in nicotine became slower and in twenty-four hours reached 70 per cent. Thus the extent of nicotine alkalization from tobacco dust in the lungs may be estimated to be 60 per cent.

The degree of nicotine alkalization in the mucous membrane of the nose could not be determined experimentally. Theoretically it may be estimated to be less than that observed in the lungs.

In order to determine the degree of alkalization of nicotine in the mouth, tobacco dust was treated with the saliva of a dog, but since the mouth region is plentifully washed out with saliva and the dust absorbed does not remain stationary there, but is either spit out or swallowed, there is no reason for experimenting on tobacco dust with treatment by saliva.

After treating tobacco dust with saliva for ten minutes, the mixture being kept in a thermostat at 37°C., I was able to determine in the filtrate 48 per cent. of nicotine; an hour later in the same sample I found 68.2 per cent. in the filtrate.

In order to settle the question of the degree of nicotine alkalization in gastric juice, I treated tobacco dust with the gastric contents of a dog, which were obtained from simulated feeding, producing both saliva and gastric juice. This liquid proved by different experiments to contain acid, corresponding to 0.22 to 0.36 per cent. of hydrochloric acid. Thus its acidity was slightly higher than that of the gastric juice of man. After keeping the tobacco dust in this liquid for an hour, I could determine in the filtrate 59 per cent. of the total amount of nicotine in the tobacco dust sample with which I was experimenting; and after six hours, the alkalized quantity of nicotine rose only to 61 per cent.

[1] This solution had to simulate the environment found by tobacco dust penetrating the lungs.

I did not undertake more extended experiments with the contents of the stomach, since five to six hours is the average length of time before they pass into the intestines. The same experiments were repeated with the pure gastric juice of a dog and gave the same average results.

It is interesting to compare the degree of alkalization of nicotine in the acid environment of the stomach with that in the acid environment of the lungs for the same period of time. It appears that the alkalization of nicotine by gastric juice is more intensive than that in the lungs (59 per cent. against 51 per cent. in an hour). It is evident that this effect is due to the digestive capacity of gastric juice.

It remains now only to show the degree of alkalization of nicotine from tobacco dust in the intestines. It could be stated *a priori* that the alkaline character of intestinal juice and its digestive action would help the alkalization of nicotine to a high degree. It was proved experimentally that in fifteen hours 86 per cent. of the total nicotine content of tobacco dust was alkalized. The intestinal juice was obtained from a dog operated on by Thiry-Vella.

I need not review my experiments on tobacco dust treated with intestinal juice to which had been added bile or pancreatic juice, or both at once, since the above-mentioned experiment has shown that the intestinal juice frees tobacco dust almost entirely of nicotine. The better digestive action obtained by adding bile or pancreatic juice to intestinal juice could increase only slightly the degree of nicotine alkalization.

Comparing the foregoing data, it can be stated that the degree of nicotine alkalization in the body juices is fairly high, averaging 60 per cent. for the respiratory tract and 85 per cent. for the alimentary tract.

Having obtained these data, I was able to determine the degree of nicotine action on the human organism from inhaled tobacco dust. In Table 2 I have shown the way in which tobacco dust is distributed in the workman's body. The average nicotine content of tobaco dust on the basis of several analyses performed by me proved to be 1.73 per cent. If we also take into consideration data which I obtained on the question of alkalization of nicotine by different body juices, it is easy to arrive at the data shown in Table 3.

It must also be taken into consideration that tobacco dust reaching the gastro-intestinal tract with nasal mucus or with phlegm from the lungs has lost about 60 per cent. of its nicotine. Thus a maximum of only 25 per cent. of this dust is capable of being alkalized. In Table 2 the average amount of nicotine alkalized from tobacco dust in the nose as well as in the lungs was estimated as 60 per cent. This is certainly the maximum amount; practically it is often much lower, especially in cases of dry rhinitis which are frequent among workmen in tobacco factories.

Comparing the data in the last column of Table 3 with the data in the same column of Table 1, we readily see that a workman must inhale, on an average, 70 mg. of tobacco dust in order to receive into his body 1 mg. of nicotine. This is the case for tobacco dust with a nicotine content of 1.73 per cent., such as that used in our experiment.

Considering the average nicotine content of tobacco dust as 2 per cent., mg. of inhaled tobacco dust produce on the organism the same nicotine

TABLE 3.—DISTRIBUTION OF NICOTINE IN WORKMAN'S BODY FROM INHALED TOBACCO DUST

PROCESS	SOURCE OF SAMPLE	QUANTITY OF NICOTINE FROM TOBACCO DUST PENETRATING INTO			TOTAL NICOTINE INTAKE FROM INHALED TOBACCO DUST BY ORGANISM DURING AN 8-HOUR WORKDAY
		Nose	Lungs	Gastro-Intestinal Tract	
		mg.	*mg.*	*mg.*	*mg.*
Sorting	at sorting	0.274	0.247	0.206	0.727
Sorting	at pinching	0.349	0.314	0.262	0.925
Sorting	at mixing	0.690	0.621	0.518	1.829
Cutting	at stands	0.203	0.183	0.153	0.539
Rubbing	at stands	0.718	0.647	0.540	1.905
Filling cigarettes	at stands	0.116	0.105	0.087	0.308

we find that for each 60 mg. of tobacco dust inhaled 1 mg. of nicotine is absorbed by the organism.

In order to obtain a more definite idea of the degree of nicotinization of the workman's body produced by inhaling tobacco dust, it is of interest to compare it with the nicotinization produced by smoking tobacco. Pontag (7) has shown that in smoking a cigarette with a nicotine content of 2 per cent. a man inhales 4.5 mg. of nicotine. Lehmann's (8) investigations have shown that an average of 10 to 15 per cent. of the nicotine in the tobacco is absorbed by the human organism in smoking; the rest is returned in smoke. Thus, the average amount of nicotine absorbed in smoking one cigarette is 0.45 to 0.675 mg.

The weight of a cigarette being 0.5 gm., it is easy to conclude that in order to nicotinize the organism to the extent of 1 mg. an average of 1 gm. of tobacco must be smoked. Thus, 60 action as 1,000 mg. of smoked tobacco; in other words, tobacco inhaled in the form of dust has a nicotine action on the organism over fifteen times greater than the same quantity of smoked tobacco. But since the quantity of tobacco dust inhaled during a workday in tobacco factories, even under the most unsatisfactory conditions, is considerably less than the average amount of tobacco smoked in a day, in spite of the conclusion stated above, the nicotinization of the organism from inhaled tobacco dust must be less than that produced by the usual amount of smoking (twenty cigarettes in a day).

Thus in our case, the workman employed at rubbing tobacco, the most unsatisfactory process with regard to dust intake, absorbs daily with tobacco dust as much nicotine as he would by smoking five cigarettes a day.

In view of this fact, how can the

acute nicotine poisoning of workmen on their first days of admission to tobacco factories, which has been witnessed by many authors (Valitzkaya, Mouratoff, Kostial, and others), be explained? Dr. Valitzkaya (9) has seen such poisonings (in 48 per cent. of the men and 60 per cent. of the women) in factories of Southern Russia. Undoubtedly, among the men some smokers were included, and it can hardly be supposed that an additional nicotinization of the organism equivalent to a few cigarettes (five to ten) could effect such cases of poisoning.

It is to be presumed that the air in tobacco factories contains volatilized nicotine in free condition which is more capable of producing a nicotine action on the workmen's organisms than is the dust which they inhale. It is quite probable that from the tobacco dust as well as from large quantities of tobacco stored in tobacco factories a considerable amount of nicotine is gradually spread in the surrounding air.

In this connection it is interesting to recall the nicotine poisoning in horses noticed by Hofstätter (10) apparently produced by nicotine vapor from tobacco.

If we assume the content of free nicotine in the air of tobacco factories to be only 0.01 mg. per liter, if we take into consideration that during a workday an average of 4 cu.m. pass through the respiratory tract, and if we suppose that the absorption of nicotine from inhaled air is the same as that from inhaled tobacco smoke (15 per cent.), we still get a nicotine action on the organism of 6 mg. during a workday.

Unfortunately we have not at our disposal data on the nicotine content of the air of tobacco factories. Among foreign authors, Anselmino has been interested in this question but there seem to be no special analyses of air for nicotine content. Among Russian authors Grodsovsky (11) only has investigated this question; he conducted researches on the nicotine content of air in a workroom for drying tobacco, which are of relative interest. Evidently this question is in urgent need of further investigation.

Conclusions

1. The alkalization of nicotine from inhaled tobacco dust by the juices of the body is fairly high, averaging 60 per cent. of the total nicotine content of the tobacco dust which has penetrated into the respiratory tract, and 85 per cent. of that which has reached the alimentary tract.

2. Inhaled tobacco dust exerts on the organism a nicotine action fifteen times greater than does the same quantity of smoked tobacco, provided the nicotine content of both is the same.

3. The degree of nicotine action on the organism from inhaled tobacco dust can be estimated thus: Each 60 mg. of inhaled dust produce on the organism a nicotine action equal to 1 mg. of nicotine, when there is an average content of 2 per cent. of nicotine in the tobacco dust. This relation can be more simply expressed in the following manner: From the point of view of nicotine action on the organism 30 mg. of inhaled dust are equivalent to one smoked cigarette.

4. The nicotine action on workmen's organisms in factories is due not to tobacco dust alone, but to inhala-

tion of free nicotine contained in the air of factories.

5. In order to settle a number of very important questions from the viewpoint of industrial hygiene, connected with the nicotine action on workmen's organisms, it is necessary to find more accurate methods for qualitative and quantitative determination of small quantities of nicotine than those at present at our disposal.

BIBLIOGRAPHY

1. Burstein, A.: Quantitative Determination (Determination of Weight) of Dust Inhaled by Human Beings. Gigiena Truda, 1926, no. 1, p. 27; abstr. in This Jour., 1927, *9*, 34, and in Zentralbl. f. d. ges. Hyg., 1926, *13*, 164.
2. Lehmann, K. B., Saito, and Gfrörer, W.: Über die quantitative Absorption von Staub aus der Luft durch den Menschen. Arch. f. Hyg., 1912, *75*, 152.
3. Saito, Y.: Experimentelle Untersuchungen über die quantitative Absorption von Staub durch Tiere bei genau bekanntem Staubgehalt der Luft. *Ibid.*, p. 134.
4. Anselmino, O.: Über den Nikotingehalt des fermentierten Tabaks. Ber. d. deutsch. pharm. Gesellsch., 1904, *14*, 139; abstr. in Chem. Central-Bl., 1904, *75*, part 1, 1368.
5. Keller, C. C.: Die Bestimmung des Nikotins in Tabak. Ber. d. deutsch. pharm. Gesellsch., 1898, *8*, 145.
6. Kraut: Cited in Jahns, E.: Über die Anwendung des Kalium-Wismutjodids zur Darstellung organischer Basen. Arch. d. Pharm., 1897, *235*, 152.
7. Pontag, I.: Investigation of Russian Tobacco and Cigarette Business. Dissert., Magazine of Works of Hygienic Laboratory of Yurieff University, 1902, issue III.
8. Lehmann, K. B.: Chemische und toxicologische Studien über Tabak, Tabakrauch und das Tabakrauchen. Arch. f. Hyg., 1909, *68*, 319.
9. Valitzkaya: Investigations of Workmen's Health in Tobacco Factories. Vestnik Obshestvennoi Gigieny of Juridical and Prophylactic Medicine, Sept., 1889.
10. Hofstätter, R.: Experimentelle Studien über die Einwirkung des Nikotins. Virchows Arch. f. path. Anat., 1923, *244*, 183.
11. Grodsovsky: Dust and Vapors in Tobacco Factories. Gigiena Truda, 1923, nos. 8–9.

ELEMENTARY OUTLINE OF SOME OF THE PRINCIPLES AND PRACTICES OF THE ELECTRIC POWER INDUSTRY AS RELATED TO SAFETY*

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INTRODUCTION

THOUGH arc lighting had been in use for a few years, the light and power industry may properly be said to have started with the opening of the Edison, Pearl Street, electric power station in New York City in 1882. This first central station had a capacity of about 1,000 horse power which was distributed over a small area to relatively few customers. The available power now has grown in the United States to a total estimated installed capacity of over 32,000,000 horse power.

This enormous power, which furnishes electric light in the living places of about 68,000,000 of our people, and power to our workshops sufficient to supply about 4 horse power for each worker, has been developed through the years intervening between 1882 and 1927—forty-five years—with surprisingly little loss of life and limb through accident. Indeed, because of the relative simplicity gained through the application of electric power to our shops, elimination of innumerable mechanical power transmission devices, such as shafting, gears, etc., and increased safety through better illumination, the actual hazards of civilized life unquestionably have been greatly decreased over those which existed prior to the introduction of electric power.

In order to understand the manner of development of the light and power industry it is necessary to review the elementary facts and laws relating to the nature of electricity. A few of the more essential follow.

ELEMENTARY CONCEPTIONS

A *current of electricity* will flow from a primary battery when its terminals are connected through a continuous electric *conductor*, such as a metal wire. This current is caused by the expenditure of chemical energy in the battery. Or a current may be obtained from a dynamo, which is being driven from some source of mechanical power, such as a steam engine or water wheel, when its terminals are connected by a continuous conductor. Electric currents may also be obtained from other sources such as storage batteries and electrothermic couples.

The conducting path through which a current will flow is called an *electric circuit*. It includes a path through the source of the current, such as the wires of a dynamo itself, and the outside conductors which complete the path.

* Written for the Engineering Committee of the Conference on Electric Shock. Received for publication Sept. 27, 1927.

Connected to these outside conductors, so that they will be jointly part of the circuit, may be filaments of electric light bulbs, heating wires of an electric iron, the wires on the armature of an electric motor, the vapor in the tube of a mercury vapor lamp, the liquid in storage batteries, or the conducting paths of the many other devices used in electrical applications.

When the circuit is complete so that the current can flow, it is called a *closed circuit* and when it is opened so that the current cannot flow, as, for instance, by pulling the conductors away from one or both of the terminals of a dynamo, it is called an *open circuit*. Sometimes the term circuit is used in designating a specific part or *branch* of a complete circuit such as the branch that serves a particular building or piece of apparatus, as a house circuit, motor circuit, etc.

Every circuit contains an electric *resistance* to the flow of current—there are no known conductors which are wholly without such resistance—therefore an impelling force is required to drive a current through the resistance of the circuit. This impelling force is variously called electric pressure, electric tension, electromotive force, or *voltage*—the last is probably the most used. In a battery the voltage results from chemical action due to the combination and arrangement of certain materials; in a dynamo it is the effect caused by the movement of conductors across the face of the poles of magnets.[1]

The resistance of a conductor, and hence the voltage necessary to drive a current of given value through it, is dependent on the material of which it is constituted and is proportional to its length, but inversely proportional to its cross section. The temperature of a conductor may also affect its resistance. Sometimes, in addition to the inherent resistance of the conductors, the voltage required to drive a current through a circuit must be sufficiently great to overcome *counter voltages* which may be acting in the circuit; thus, a motor, which is running, generates such a counter voltage.

Electric Power

The rate of doing work or expending energy in an electric circuit is proportional to the product of the current and the voltage which is active in driving the current, much as the rate of energy being expended on a moving steam train is proportional to its speed multiplied by the active mechanical pull exerted on it by the locomotive. The current in this illustration is analogous to the speed of the train and the voltage to the force required to pull it.

When electric power is applied to a circuit, the energy expended may be absorbed by producing heat as the current is forced through the resistance of the connecting wires or appliances through which the current flows in the circuit, much as the mechanical energy of the locomotive expended on the train, which is running on a level track, produces heat by overcoming the mechanical resistances of wheel bearings, track, etc. More or less heat is developed in this way in all circuits when current flows, the amount being proportional to the resistance and the square of the current. The energy used in forcing a current

[1] See p. 523.

through the filament of an electric lamp heats it to incandescence because its resistance is relatively high, while the heating of the copper wires of low resistance which connect the lamp to the circuit may be inappreciable as their resistance is relatively low. Copper wires, however, may also be heated to the melting point if a sufficiently heavy current be sent through them. Electrical energy may also be converted into mechanical energy as in an electric motor.

Units of measurement have been adopted for electrical quantities of which the following are the most common. The *ampere* is the official unit of measurement of electric current, the *volt* of electric pressure or voltage, the *ohm* of electric resistance, and the *watt* of electric power. These names are given in honor of famous scientists who did important pioneer work in the development of early electrical knowledge. The *kilowatt* is the unit of power used in practice and is equal to 1,000 watts. A kilowatt is approximately one-third larger than the *horse power*.

Earlier it was stated that over 32,000,000 horse power is available in the electric power plants of the United States; this equals about 24,000,000 kilowatts. The energy actually developed or the work done by this enormous total equipment is almost 70,000,000,000 kilowatt hours in a year.

The practical unit of electrical work is the energy expended by the power of a kilowatt during the period of one hour and is called the *kilowatt hour*. It represents about one-third more work than a horse power hour, or a horse power working for an hour.

The amount of power required for common appliances varies through wide limits. Thus, an electric lamp of common size absorbs 25 watts at a voltage of 110 and a current of from $\frac{1}{5}$ to $\frac{1}{4}$ of an ampere; toasters may require from 5 to 10 amperes at the same voltage and absorb from a little over $\frac{1}{2}$ a kilowatt to something over 1 kilowatt; a fan motor may absorb $\frac{1}{8}$ of a kilowatt more or less; industrial motors may absorb electric power from a few watts up to several thousands of kilowatts with various voltages, though voltages from 110 to 250 volts are common; while a power company may furnish to its many customers a maximum of several hundred thousands of kilowatts which require the distribution of thousands of amperes, and it may find it economical to use in parts of the system voltages of many thousands of volts.

The resistance in the conductors used for distributing power is kept low in order to avoid wasting energy by generating heat, and also sometimes in order to avoid dangerously overheating them. The resistance of wiring of a residence, for instance, should be only a small fraction of an ohm. In heating appliances, however, the resistance is relatively high; thus, the resistance in the hot filament of the lamp mentioned above is nearly 500 ohms and that of the toasters from 11 to 22 ohms.

The flow of electric current is accompanied by magnetic effects of much importance to the electrical industry. Thus, when a current is passed through a coil of wire which is wrapped about a piece of iron it converts the iron into a strong magnet; the magnetism largely disappears when the current is

stopped if the iron is soft. Such a magnet is called an *electromagnet*, in order to distinguish it from a hard steel, permanent magnet. Its use is essential to the working of most electrical machinery, for when a wire is pushed rapidly across the strong *magnetic field* close to the pole face of an electromagnet it has a substantial voltage induced in it, or, when wires surround or are near an electromagnet while the current is changing in its coil and hence its magnetism is changing, voltage is induced in them.

The best conductors of electric currents are metals, but certain other materials have the capacity to conduct electricity to a greater or less extent and hence it is necessary to make special provision to *insulate* electric circuits in order that the current may be confined to the wires of the circuit itself. It is evident, therefore, that problems of insulation are of prime importance in the electrical industry. *Nonconduciors* used for this purpose are called *insulators* or *insulation*.

Insulation

In the days of the Pearl Street station protective insulation for power and lighting circuits and apparatus had to be developed. Suitably prepared materials available for the purpose were few, and there was extremely limited experience in their use. From the inception of the electric power industry, however, careful attention has been given to the subject of insulation and other protection which would confine electric currents to designated channels. This is largely to protect against possible destruction of property by fire, shutdown, or destruction of electrical machinery, and also for the prevention of accidents to workers in electrical plants and to users of electrical contrivances.

Faraday and Henry, who discovered the phenomenon of electromagnetic induction, and other scientists of a century ago and earlier, found the need of wrapping with insulation, usually strips of dry cloth, the wires which they used in their experimental work, or of placing them on insulating supports, such as glass, in order to prevent the leakage of electric currents from the metallic conductors which they used.

Further progress in insulating electric circuits was made after the invention of the telegraph by Morse, and still later, in the seventies, by Brush and others in the arc lighting industry. But little relative advance had been made, however, up to the time when Edison began his work. After that, and up to the present time, progress in the development of insulation and insulators and other methods of protecting electrical equipment, and of promoting safety in its use, have been active and effective.

Indeed, it has been because of the success of this activity that enormous concentrations and wide distribution of electric power, which is not usually detected by the senses of sight, hearing, or smell, have been accomplished with a relatively small number of fatalities or injuries to human beings and with relatively little property destruction.

Among widely used insulating materials are the following:

Glass is largely used for supporting wires, especially those bearing low voltages, such as telegraph wires. It

is also useful in various other situations.

Porcelain is now quite universally used for high voltage line insulators and similar purposes.

Rubber is used widely for insulating or covering wires of low and medium voltages with the addition of braidings of cloth impregnated with pitch or other insulating compounds. Rubber gloves and other rubber protective devices are used by electrical workers.

Oils are used in transformers, switch cases, etc.

Oiled paper and cloth are used for insulating conductors in machinery, etc. Shellac, oils, resinous and other liquid insulating materials are used for impregnation of a variety of porous insulating materials, and as binders for building up special insulation shapes.

Mica and asbestos are made up with insulating binders into innumerable shapes.

Other insulators of great variety, constitution, and importance have been devised for various specific purposes in the building of electrical machinery and the transmission of electric power, such as *slate and marble*, which are used for switchboards, *asbestos board*, *pressed fiber*, dry *wood*, plain *paper* used for insulating the conductors in lead covered cables, etc.

Air is an insulator, so that wires carried on insulators, attached to poles or towers, between which a voltage must be maintained, are kept separated in the air by a requisite distance. When the air is moist or when it is raining, an air space is a much less effective insulator than when it is dry.

The insulators of practice have relatively very high resistances so that little current normally leaks through them, but they must have sufficient *dielectric strength* for the purpose for which they are to be used; that is, they must be able to withstand the voltages to which they may be exposed without breaking down, just as it is necessary in building a steam line not only to use material which will not leak, but also to make it strong enough to resist the strain of the steam pressure without bursting.

The *conductors* used in electrical work are usually of copper, because of its low resistance to the passage of current; aluminium wire, however, is also used; and copper clad steel wire of great strength is employed for transmitting electric power when the supporting towers are spaced far apart and mechanical strength is important. When it is desired to develop much heat or impede the flow of current, high resistance metals or alloys are used as conductors, thus, tungsten is used for lamp filaments, and high resistance metal alloys in electric irons, toasters, etc.

Elements of Electrical Systems

The primary electrical element in an electric power system is, of course, the *dynamo* or *generator*. It consists in essence of a large number of wires suitably arranged on a laminated iron core (the *armature*), which, when mechanically revolved in the magnetic field near a pole of an electromagnet, have a voltage generated in them. This voltage alternates as the wires pass under positive and then under negative magnetic poles of the electromagnets (*the field*), which surround the armature.

If the armature wires are connected to an outside electric circuit, an *al-*

ternating current will flow under the impulsion of the alternating voltage, that is, unless the wires are appropriately connected to a *commutator*, in which case the current will be rectified—it becomes a *direct current*.

Early power plant generators were small, of a few hundred kilowatts' capacity or less, but they have rapidly grown in size until now steam turbine driven units, building for power companies in New York City, are of 165,000 kilowatts' capacity—large enough to light the homes and streets of a city of a million people.

Ordinarily a dynamo becomes a motor if a current is sent from an outside source through the wires of the armature. In this case the reaction between this current and the magnetic field causes the armature to revolve. In the dynamo mechanical power is converted into electric power and in the motor electric power is converted into mechanical power.

The early arc lighting was done through what were called *series*, direct current systems; that is, the lights were placed one after another in the circuit of a wire, which ran from one terminal of the dynamo through the streets back to the other terminal (see Fig. 1). This is somewhat as beads are placed one after another on a necklace. With this arrangement, if something goes wrong with one lamp so that current cannot flow through it, all of the lamps in the circuit will go out unless there is some device provided to *shunt* the current around the bad lamp. Series connections are still used in street lighting and for special purposes.

Edison evolved the *multiple* system where the lights are placed in *parallel*, or side by side, between two wires which run to the terminals of the dynamo (see Fig. 2), somewhat as rungs are placed between the side bars of a ladder. This enables any of the lights to be turned off or on without affecting the others. Thus, in Figure 2, if all the lamps but one are taken out, current will continue to flow around through this one lamp, as the circuit is still complete through it. If two lamps are on, they make two parallel paths for completing the circuit, and so on.

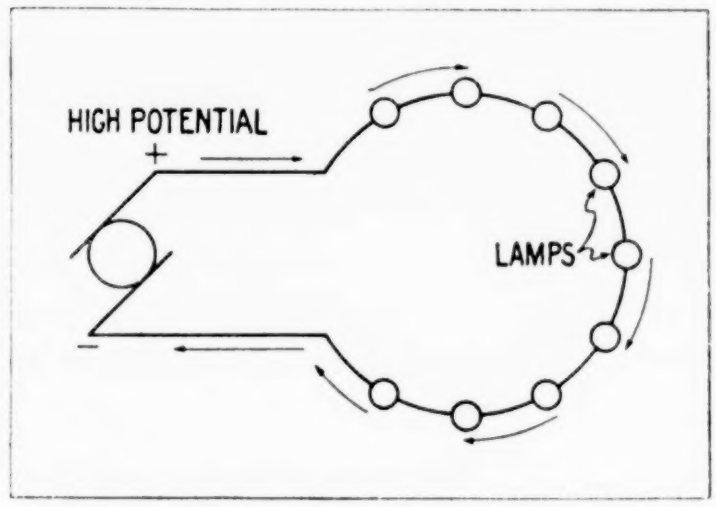

FIG. 1.—Diagram of direct current series connections.

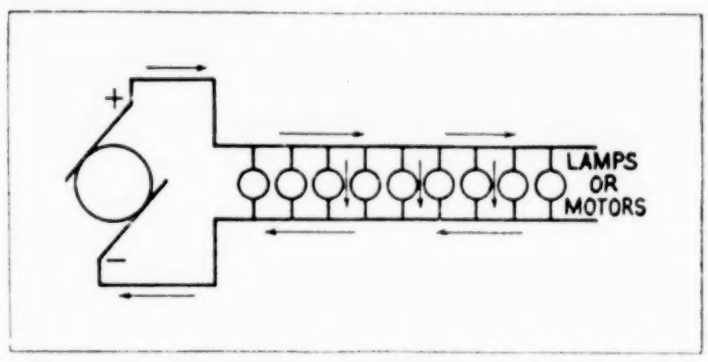

FIG. 2.—Diagram of direct current two-wire multiple connections.

Instead of indicating single lamps, the circles in the diagram might as well indicate houses in each of which there are many lamps connected in multiple to the branches leading to the several rooms of the house, which are in turn connected in multiple to the supply wires coming into the house.

A number of circuit lead wires or

feeders, like the pair leading to the lamps shown in Figure 2, may be connected to the dynamo terminals in multiple; or, instead of one dynamo, two or more may work in multiple by having their like terminals connected together through conductors, often called *buses*. The feeders to the lamps or houses would then be taken from the buses. This multiple arrangement is the fundamental feature of modern power distribution.

The early systems had circuit voltages of about 110 volts and supplied lights and motors which absorbed that voltage. Then Edison developed the three-wire system which used slightly over 220 volts and two 110-volt generators in series, but with a neutral or return third wire which enabled 110-volt lamps to be used (Fig. 3). Because of the higher voltage the weight of copper required for the distributing wires was reduced.

Following these systems, which were mostly direct current—steady flow in one direction—came the alternating current, which was early generated and distributed at 2,200 or more volts, and was much more of a hazard to human life than the low voltage, multiple, direct current systems (Fig. 4). The alternating current, as indicated earlier, is one which reverses its flow periodically in a circuit. Sixty complete *cycles* of alternation per second is quite commonly used in power systems, as is also twenty-five cycles per second. The number of cycles per second is called the *frequency*.

These alternating current systems, like that of Edison, are ordinarily used with multiple connections. By means of *transformers*, however, alternating currents can be changed into any voltage desired, such as from several thousands of volts on the

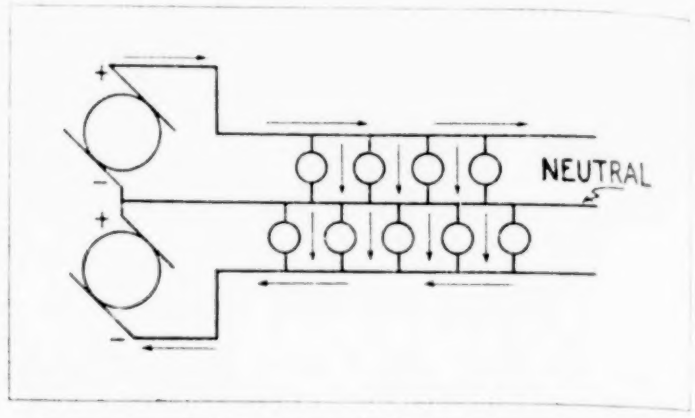

FIG. 3.—Diagram of direct current three-wire system.

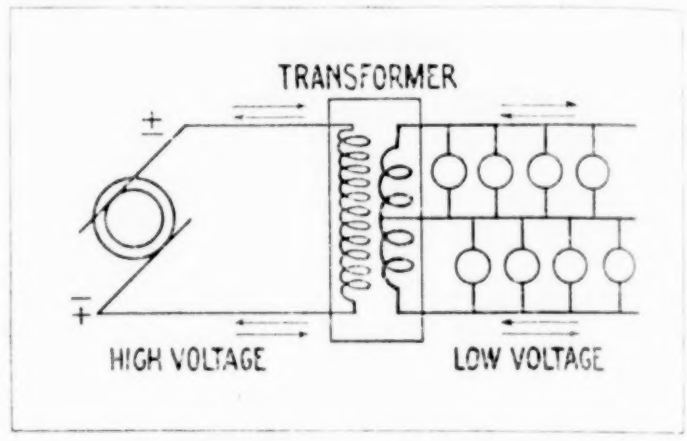

FIG. 4.—Diagram of a simple alternating current circuit with a transformer for reducing the voltage. The secondary or low voltage side is connected for three-wire service.

feeders in the streets to 110 or 220 volts for introduction into houses or factories.

The transformer is in essence two coils of wire wrapped on a soft, laminated iron core. When an alternating current is introduced into one coil it induces voltage in the second coil, through magnetic effects as the magnetism rises and falls with change of current in the first coil caused by its alternations. The voltages across the terminals of the coils of an ordinary transformer will be about proportional to each other, as are the numbers of turns of wire in the two coils when no current is flowing in the second coil. Thus, if the first or *primary* coil had 1,000 turns and a voltage of 1,000 volts

was impressed upon its terminals, there would be induced approximately 100 volts in the *secondary* coil if it had 100 turns, 500 volts in a secondary coil having 500 turns, or 10,000 volts in a coil of 10,000 turns, and so on (see Fig. 4). When the secondary coil is connected to a circuit, the current flowing in the primary and secondary coils will be approximately inversely as the number of turns on the two coils, and the power coming out of the secondary will be the same as that going in at the primary less the small losses in the transformer itself. The closeness of these ratios will be dependent on the amounts of heat lost in the resistance of the coils and on other losses. For voltage regulating purposes a transformer secondary coil may be made movable so that it can be moved or turned in such a way that part or none of the magnetism set up by the primary current will pass through it. In this way the secondary voltage can be varied from zero to its normal ratio value. Such special transformers are called regulators. When the secondary coil of a transformer has the lower voltage it is called a *step-down* transformer and when the secondary voltage is the higher it is a *step-up* transformer.

Today, in modern electrical plants, *polyphase* systems are usual. In one of these, the *three-phase system*, three wires are commonly used for transmitting electric power and carry alternating currents which vary in phase (see Fig. 5). A rough analogy to these currents is that of mechanical impulses developed by the cylinders of a six-cylinder gas engine in which a mechanical impulse is transmitted to the shaft for each 120 degrees of rotation. Each of the three pairs of the three transmission wires carries

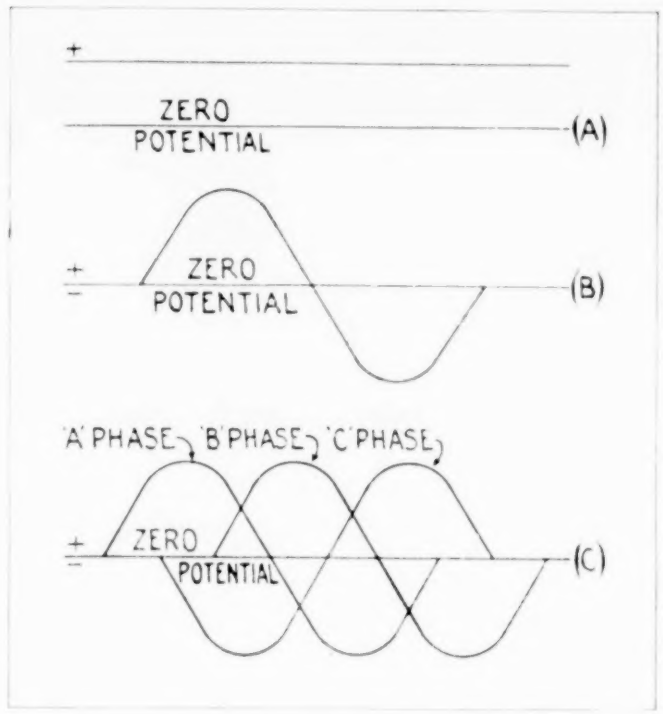

FIG. 5.—A = direct or rectified current. B = simple alternating current—single phase. C = three-phase alternating current.

Note: At least three wires must be used for transmitting three-phase currents. With three wires, a phase is connected between each of the three pairs of wires—*i.e.*, as they might be connected to three corners of a triangle.

a phase of the alternating current, and the three phases are separated in time by a third of the period or time of an alternating current cycle, just as the three impulses of the cylinders of the gas engine are separated by the time of a third of a revolution of the shaft. From the three-phase system the three pairs of wires of three single phase circuits—simple two-wire circuits—may be led, but they must be equally loaded or the system will be unbalanced and will not act satisfactorily, just as the gas engine will not run smoothly unless all of the cylinders are working properly.

Circuit breakers or *switches* are used near a dynamo to cut it off from the outside circuits to which it may be connected, or to disconnect any

feeders, branch circuits, or appliances from the source of power, much as a valve in a pipe is used to shut off water or steam. The two terms are in essence synonymous, but the term circuit breaker is more often applied to switches that have certain automatic features spoken of later. The larger circuit breakers in the early days were usually in the form of knife blades worked by hand, and in power stations were arranged in orderly manner on a marble switchboard. By opening the switch blades, an air space or break is introduced into the wires of the circuit through which the current cannot flow. The snap or button switches in houses and other small switches are worked on this same principle.

Today, however, circuit breakers in electric stations have grown so large in size and number and the voltages have become so high that they are operated by small motors, or some electromagnetic appliance, which in turn are operated by small hand switches on a control switchboard (Fig. 6). They are the same in principle as the simpler ones described, but are of the automatic oil type, that is, they not only can be opened or closed at will by the operator, but will also open automatically by means of an electromagnetic appliance if the current flowing through them becomes higher than the apparatus that they protect can bear without overheating or strain; the blades are immersed in insulating oil which is free from moisture, so as to smother the flash (spark) which might occur if a heavy current of high voltage were interrupted in the air (Fig. 7). The advantage of using oil circuit breakers is evident when it is understood that the flash which may occur when breaking a circuit transmitting heavy power at high voltage may be quite severe. The flash results from the creation of conducting metal vapors as the switch blades separate and from the tendency of a current to keep flowing as though it had momentum like a moving vehicle.

Similar circuit breakers are used on all of the important *feeders* or circuits leaving the stations and in interconnections through buses, etc., between machines and circuits. When a circuit breaker is open and the circuit which it controls is completely cut off from the source of voltage, the circuit is called *dead;* if not completely cut off, it is *alive*. If only one of the wires of a simple circuit having two wires to the source of power is cut off, current cannot flow, but the circuit remains alive and may cause a shock if touched, as there may be a substantial voltage between that part of the connection to the circuit remaining closed and the earth.[2] The snap switch controlling the lights in a room often cuts off only one side of the circuit. Opening it turns off the lights but the circuit remains alive. Larger switches usually open all wires connected to the source of power and thus kill the circuit.

In houses a hand operated switch is placed where the wires enter, and usually with it are placed smaller switches and *fuses* for all of the branches to the circuit which pass to various parts of the house. Fuses are in effect automatic circuit breakers, but instead of being operated by the current in an electromagnetic appli-

[2] See p. 545.

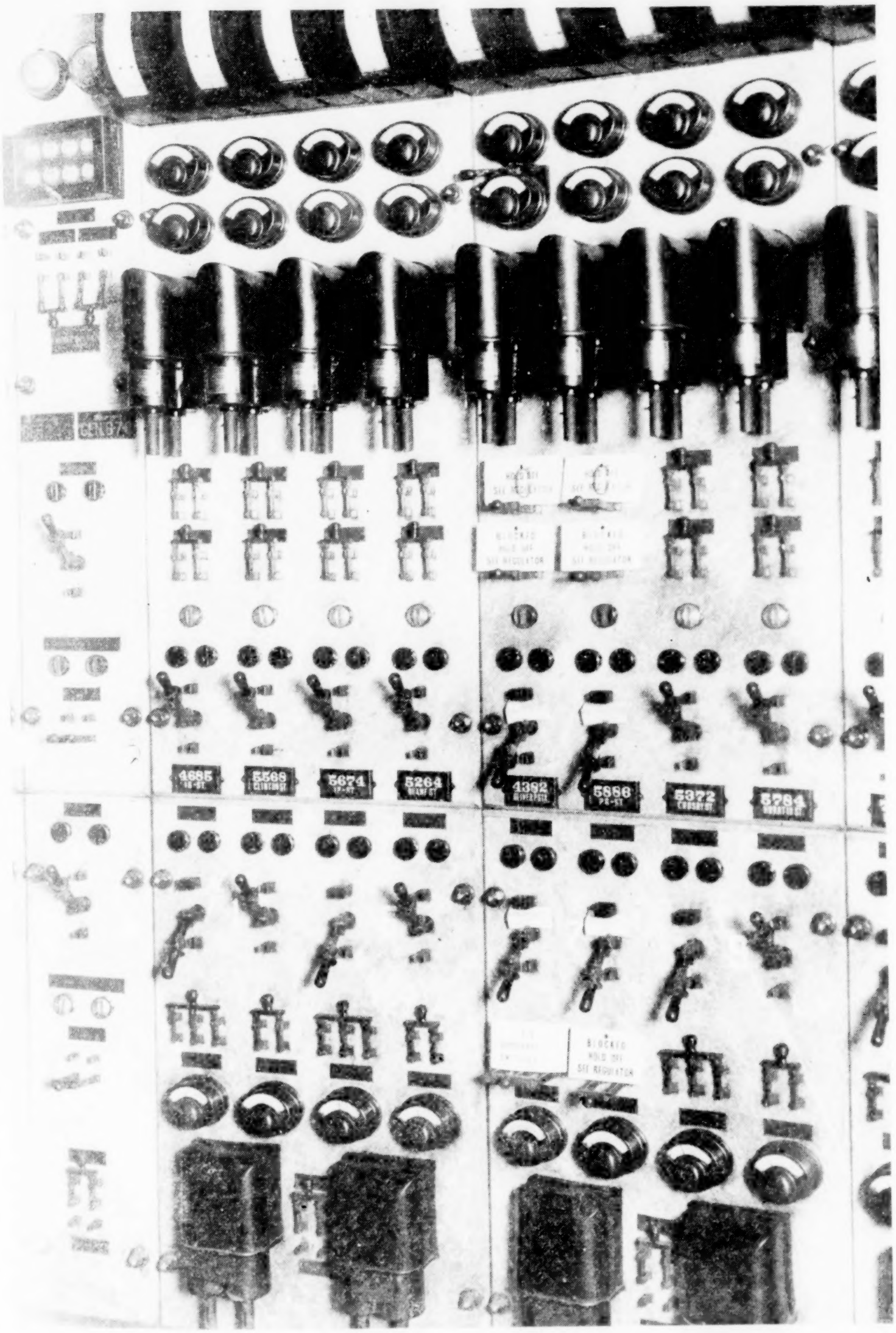

Fig. 6. Panels of a control board showing meters (at top and near bottom), control switches, pilot lights, and other control apparatus, with two circuits blocked and tagged.

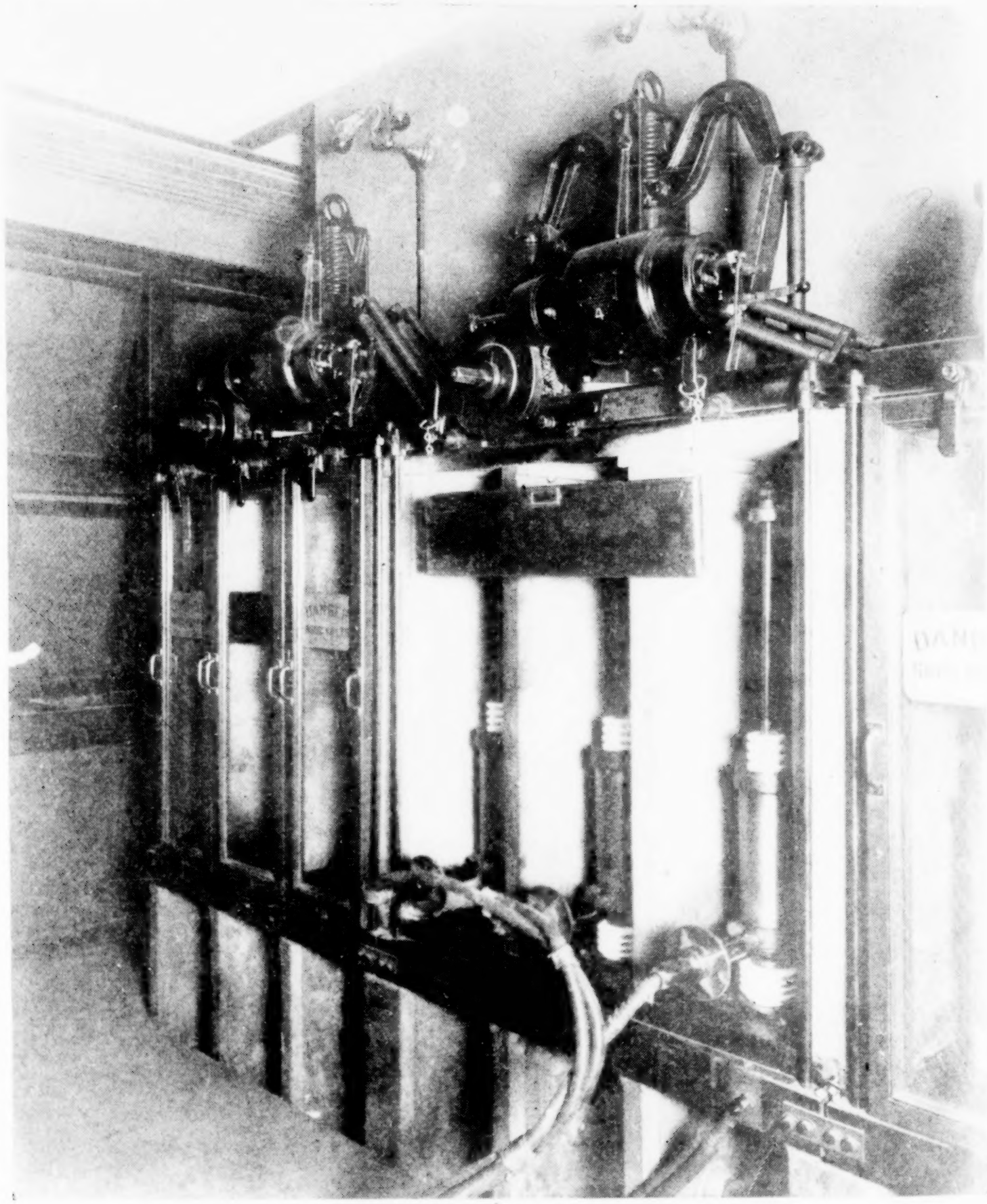

FIG. 7.—Three-phase high voltage switches. The first one has the compartment doors removed, and the three oil pots (in this case part of the circuit connections), containing the switch blades, are grounded for safely making repairs. (See paragraph on grounding, in the section on "Electrical Utilization.") The switch operating mechanism is on top of the compartment and is controlled by an operator at the control switchboard in another room.

ance as are the large automatic circuit breakers, described above, they consist of short strips of metal, which melt at a low temperature, inserted into the wires of a circuit and open it by melting out when the portion of

the circuit which they protect is overloaded. This apparatus is usually assembled on a fireproof panel in a cabinet or is otherwise arranged to eliminate the danger of unintentional contacts.

In addition to the control switches which control the large circuit breakers at the central board in a power plant, are to be found many meters. Among the most important of these are voltmeters which indicate electric pressures in volts; ammeters which indicate current in amperes; and wattmeters which indicate power in watts. These meters are placed on all circuits where essential to enable the switchboard operator to regulate properly the apparatus under his control (Fig. 6). Recording meters of various kinds are also much used in electric stations and elsewhere. Recording meters used in houses record on dials the kilowatt hours of energy consumed.

The *load* of a circuit (lamps, motors, heating devices, etc.) has sufficiently high resistance normally to prevent an undue flow of current; if, however, any of the wires which lead to the load get together accidentally, a low resistance circuit (or *short circuit*) is created through which the generators on the system may send a dangerously heavy current. Automatic circuit breakers, either of the electromagnetic or of the fuse type, are arranged on power systems so that they will shut off the injured branch of the circuit in case of a short circuit and usually prevent serious damage. This is possible in practice, as indicated earlier, because of the use of multiple or parallel connections; thus, a feeder connected to a dynamo or a power house may be shut off without interfering with other feeders to the same dynamo; a service tap from this feeder to a house may be cut off without interfering with other houses on the feeder; the cutting off of a branch of the house wiring does not disturb other branches, etc. In the same way one of the big pipes from a water reservoir, supplying a section of a city, can be cut off without interfering with the water supply to the rest of the town; a water tap to a house may be shut off without disturbing the other houses; or a branch pipe in the house may be closed and not interfere with the rest of the house supply, etc. In the case of water supply, however, the valves are hand operated, while in that of electric power supply there are arrangements not only for hand control, but also for automatic control, so that an injured section of the electrical system is at once automatically cut off in case of trouble.

The modern electric power system may be roughly divided into five parts:

1. *Electric Power Stations.*—These are the plants in which the electric power is generated. When stations are operated by an electric power company they are commonly called *central stations.*

2. *Substations.*—Substations may receive power from power plants and raise it in voltage by transformers for sending it long distances. They are then sometimes called step-up substations. They more often receive the power at a distant center of distribution and reduce the voltage, or rectify it to direct current, for distribution to customers; in this case they are frequently called *distributing stations.*

3. *Transmission Lines.*—This name is usually applied to lines of wire

which transmit power at high voltage between widely separated points, as from a secondary coils of these transformers and supplied to the customers.

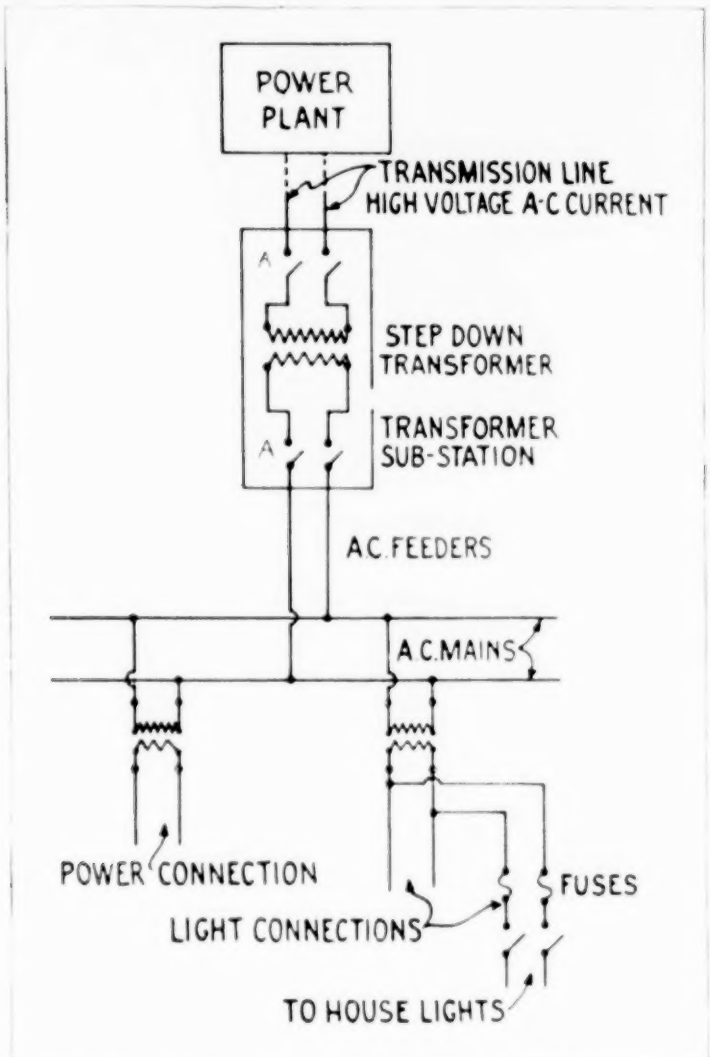

FIG. 8.—Elementary diagram for indicating travel of electric power from the power plant to the consumer—alternating current system entirely. Two wires per circuit only are shown for simplicity.

Note: A = usually automatic oil switches and with them disconnect switches. Other switches are used for sectionalizing, etc. Fuses are at the small transformers. Switches and fuses are at building entrances, etc.

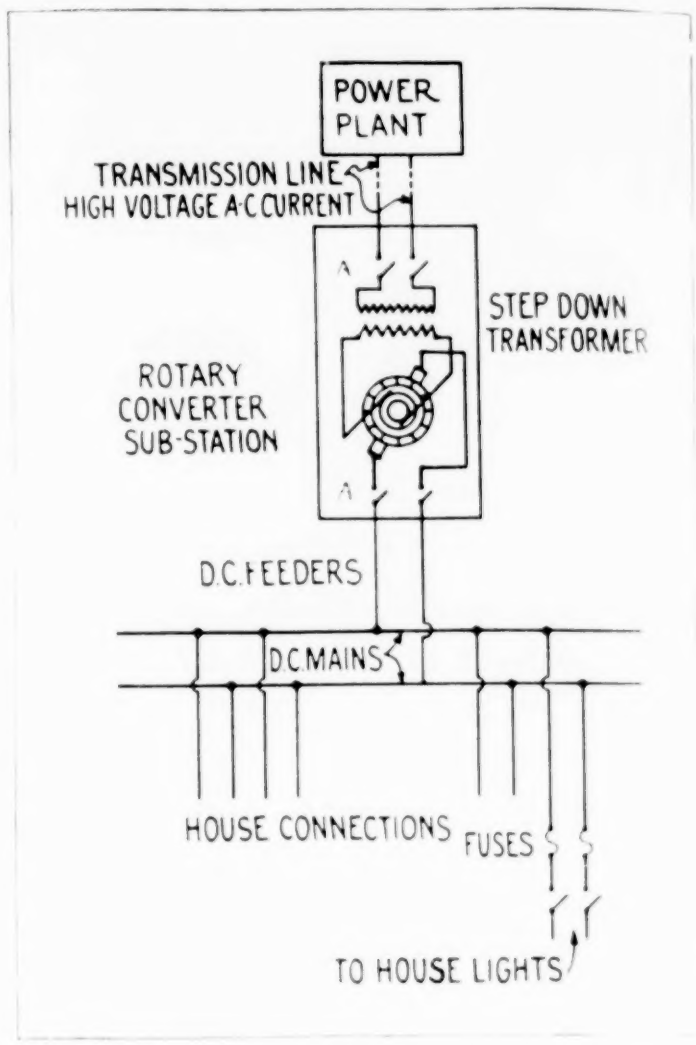

FIG. 9.—Elementary diagram for indicating travel of electric power from the power plant to the consumer—alternating current generation and transmission and direct current distribution. Two wires only are shown on the alternating current part, for simplicity.

Note: A = usually automatic oil switches and with them disconnect switches. Other switches are used for sectionalizing, etc. Switches and fuses are at building entrances, etc.

from a power station, or step-up substation, to a distant distributing station.

4. *Primary and Secondary Distribution.*—The term primary distribution usually is applied to the distribution of power from distributing stations at moderately high voltages to the primary coils of transformers, which are located adjacent to local centers of customers' load. The secondary distribution is the low voltage power taken

5. *Electrical Utilizations.*—Electrical utilizations are the lamps, motors, and numerous other electrical appliances used by customers for residential, commercial, industrial, or other purposes, the power for which constitutes the load of the power system.

For simple diagrams of electrical systems reference may be made to Figures 8 and 9. These diagrams are most elementary for the sake of simplicity, and omit many elements; but

of these, the ones of importance to this article are dealt with in the following pages.

Electric Power Stations

The electric power station contains the electric generators or dynamos, which are usually driven by steam or water power. The former are called steam and the latter hydroelectric stations. It is now common to build the steam turbine and its generator, or the hydraulic turbine and its generator, into single units. (See Fig. 10.) These units are called steam or hydroelectric *turbogenerators*. A number of these units are usually found in each station, which may vary in capacities from possibly 20,000 to 150,000 kilowatts or more, and with total station capacities ranging from 50,000 to 1,000,000 kilowatts. The efficiency of the steam stations has increased very greatly since the years following the first Pearl Street station and especially during recent years. Stations are now running which use a pound or less of coal per kilowatt hour produced, while in the earlier days from 3 to 12 pounds were used, and labor and other costs have been reduced more or less proportionately. Hydroelectric stations have also reduced the cost of producing electrical energy.

In electric power stations the voltages may vary from a few thousands to twenty or more thousands of volts. The general plan of the electrical side of a station consists of several generators which feed through carefully insulated and supported cables to buses, by means of which they are connected to run in multiple or parallel. From the buses, feeders or transmission lines, connected in parallel to the buses, are led out of the station for transmitting the current to step-up substations or centers of distribution.

Between the generators and the buses and in the outgoing transmission lines or feeders are interposed automatic circuit breakers, referred to earlier, in order to connect into the circuit or cut off any generator or feeder as desired. Each circuit breaker is so set that it will open if the line or apparatus to which it is connected becomes overloaded or is short-circuited, or it may be opened or closed by the operator as the load on the plant requires. In the various parts of the circuits indicating meters are placed which enable the station operators to observe the conditions as to loads, etc., necessary to enable them to control the station apparatus in such a way as to maintain high efficiency and safety. Other switching and control arrangements are to be found in stations, but those named are the most fundamental.

The high voltage automatic circuit breakers and all of the other equipment used that connects with high voltage are installed in fireproof compartments in locked switch galleries, except the cables which are in protected tunnels or ducts These compartments are closed in front by doors and are carefully numbered and marked with danger signs (Figs. 11, 12, and 13), and sometimes they are individually locked.

Before any workman is permitted to remove a door of a compartment containing a circuit breaker or other high voltage apparatus, he must receive written authority from the operator in charge, with information that the

apparatus on which he is to work has been cut off the circuit and is dead. trol board his control switches, which open the main switches necessary to

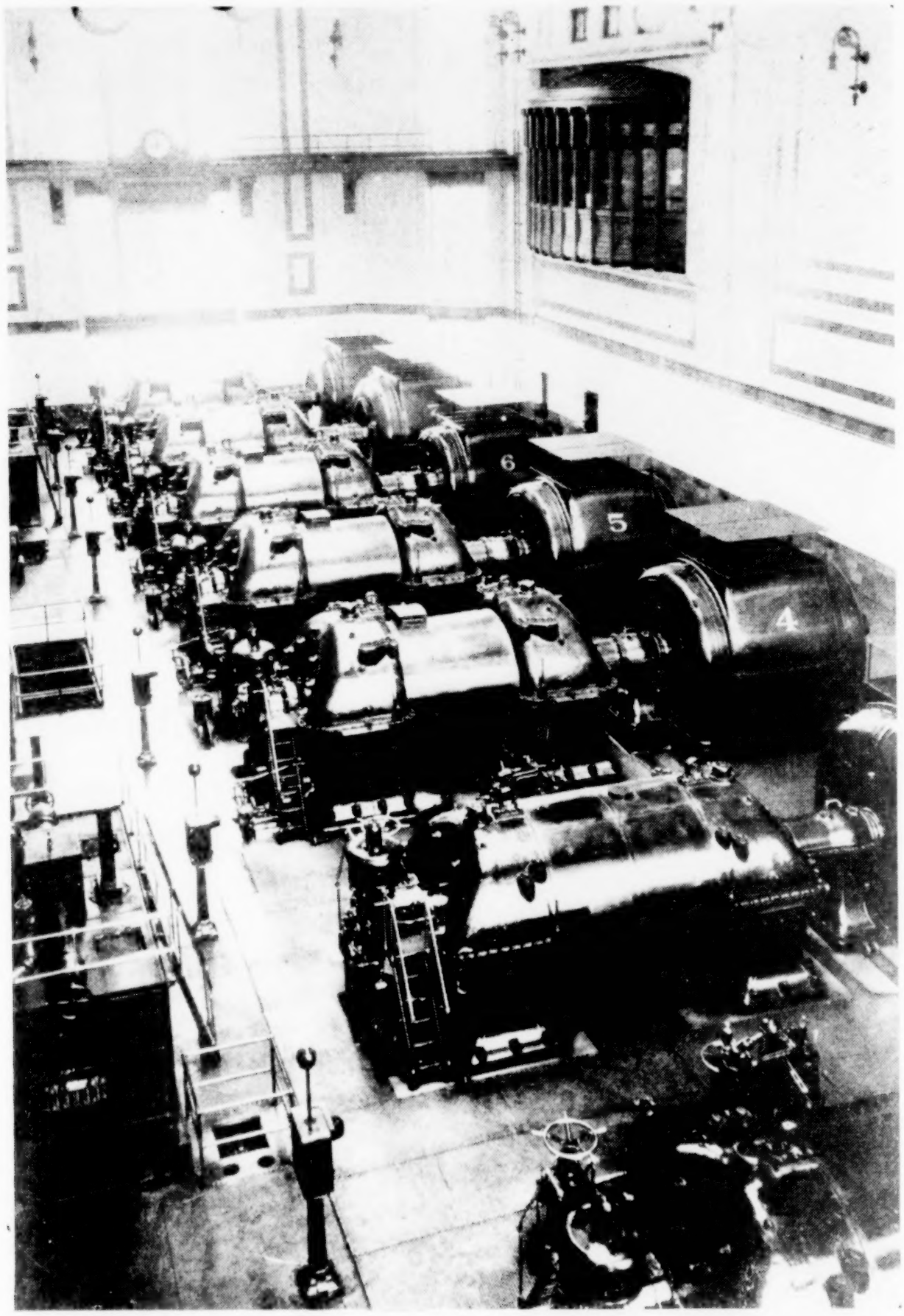

FIG. 10.—View of steam turbogenerators in the turbine room of a large generating station.

The authority is given only after the operator at the control board has *blocked* open and *tagged* on the con- isolate the high voltage apparatus to be uncovered, and any other steps necessary to safety are taken. The

control switches cannot be closed without removing the blocks.

operator in charge. For added protection they make such additional

FIG. 11.—Locked door, with notice to keep locked, opening into a feeder switch gallery. The panels to the upper right are at the rear of a locked bus gallery. They are not opened except in emergency.)

In taking off doors to apparatus two experienced men are usually sent together. These men follow the written authority and instructions of the tests, while in the switch galleries, as are necessary to prove the circuit to be dead, and when they open the doors of the compartment of a circuit

breaker they block the switch mechanisms so that the breaker cannot be

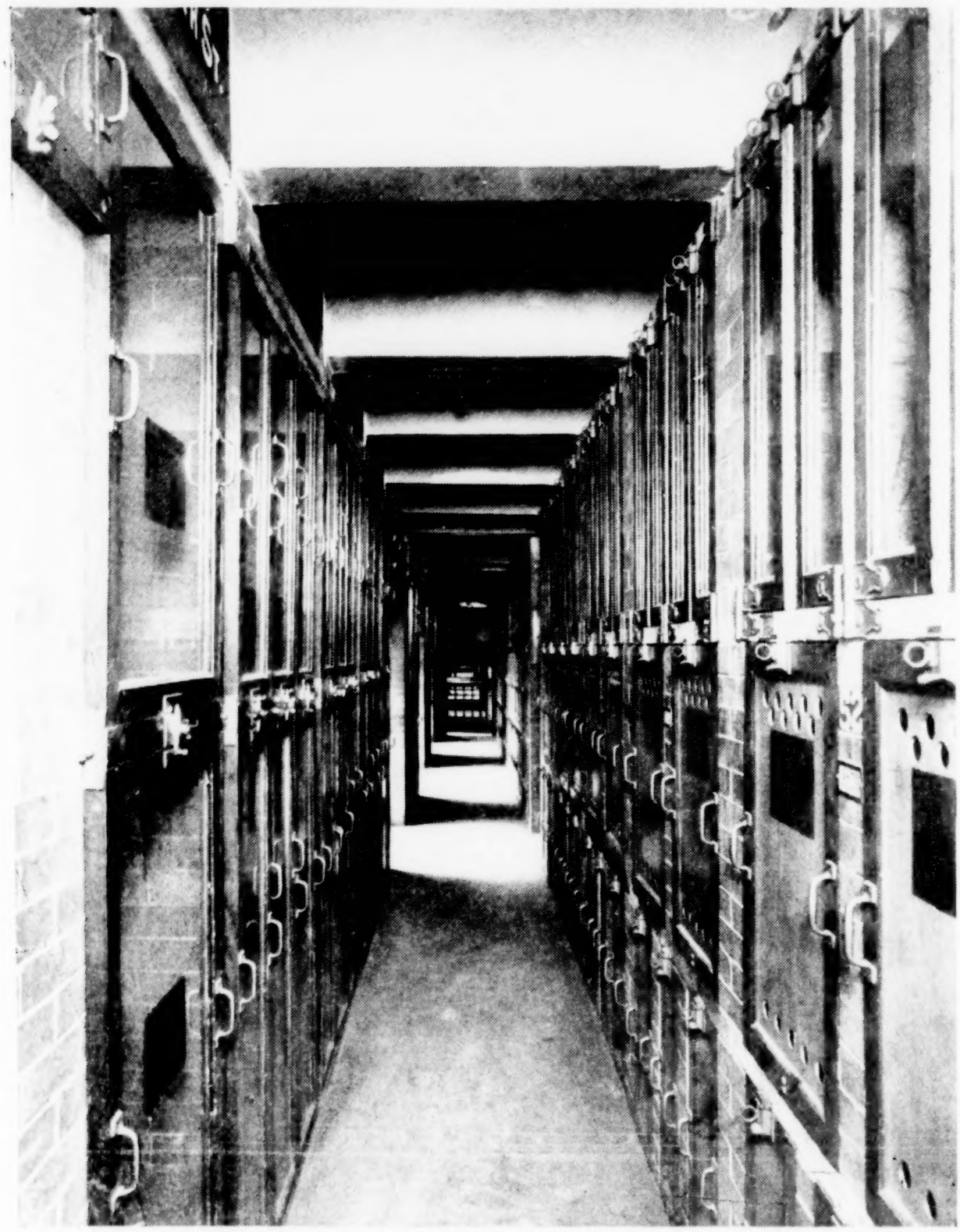

FIG. 12.—Bank of three-phase switch compartments with doors in place. These are all marked with serial numbers and danger signs.

closed even from the control board. In addition, where desirable, they place ground connections for further protection.[3] They also attach to the apparatus, which has been made safe for workmen, tags which show it to be dead, and, if such is the case, that men are working on it.

The switches on the control board of a generating station (Fig. 6) are connected to auxiliary or control, low voltage circuits that run to the small

[3] See p. 545.

motors or other appliances used for operating or closing the circuit breakers

FIG. 13.—High voltage bus compartments in a generating station. The bus connections are reached through the doors for cleaning and repairs, after the buses have been made dead.

in the switch galleries, and for controlling other apparatus. Where a number of stations are supplying power to the same system there is usually a supervisory center called the Dispatcher's Office, under the direction of a *dispatcher*, which is used to co-ordinate the entire system and permit it to be operated to best advantage. Figure 14 shows such an office, with telephone connections to all important points, and a board which indicates conditions over the entire system.

The *interconnection* of two or more systems, each with its own complete equipment of power plants, substations, lines, etc., is now quite common. Interconnection is usually made for the purposes of having the joint facilities of all of the systems available to meet emergencies and for producing and distributing power more economically, by being able to use the combined equipments of the systems more efficiently and to reduce the total of reserve equipment without reducing the safety and continuity of operation. Where systems are interconnected, interchange of power from system to system may be for definite quantities of energy, furnished under specific conditions, or it may be carried through by a central agency having duties similar to those of the dispatcher to which reference was just made.

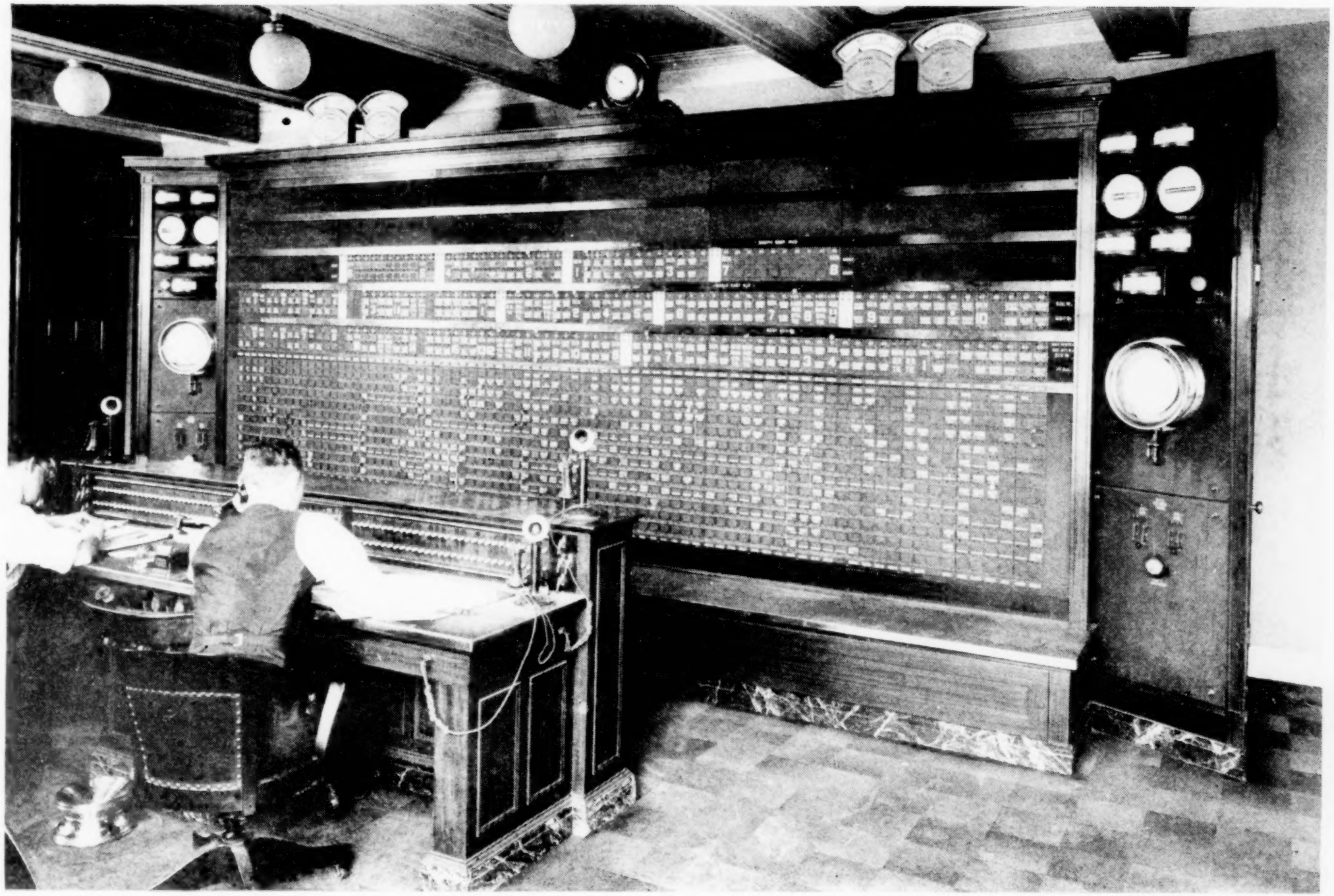

FIG. 14.—System operator's or dispatcher's pilot board from which load dispatching is done. This board shows by lights whether the important feeders and turbogenerators are or are not in service.

Substations

Substations are principally of two kinds: transformer substations and rotary converter substations.

The *transformer substiations* may be used outside of a power house to transform or step-up the voltage to a high value, such as 33,000, 66,000, 110,000, 220,000 or so volts, for transmitting power over long distances; these are step-up substations. Loss of energy in the resistance of transmission wires is proportional to the square of the current. Therefore, decreasing the current required for a given amount of power, by increasing the voltage, may prove economical by reducing the energy losses expended in heating the wires, or by making it possible to save copper, if that is preferred, by the use of smaller wires of higher resistance. Indeed, high voltages running into many thousands of volts are essential economically for the transmission of large amounts of power over long distance. Under such conditions the weights of the transmission wires, where the voltage is low, say in the hundreds of volts, would be so great as to make the transmission impracticable.

Step-up substations are commonly placed out of doors in a yard enclosed by a fence or other protective barrier. Much of the apparatus is arranged on a large structural steel framework in a manner which will enable it to be operated with maximum safety. Figure 15 shows banks of switches, transformers, and other necessary apparatus for an outdoor substation.

Transformer substations of the step-down type, or *distributing stations*, receive power at high voltages from a transmission line or power station and reduce its voltage for the purpose of distributing it through the streets of a town or other community. These stations are more frequently housed in specially prepared buildings though they are also often of the outside type, especially when the voltages received are high.

In *rotary converter distributing stations*, alternating current is received and its voltage stepped by transformers to such a value that when it is run through the moving armature of a *rotary converter*, direct current can be taken off at the voltage needed, for instance, 500 or 600 volts for street railways, or a value which will supply 110 to 220 volts for lighting purposes. Figure 16 is a view of the rotary converters in a substation. These stations are placed in a building to protect the moving machinery from the weather.

In the rotary converter or indoor transformer substations the high voltage apparatus, circuit breakers, buses, etc., are of much the same character as they are in the power station and are enclosed in compartments in locked switch galleries. Similar arrangements for controlling these and for protecting workers are also used. In the secondary or low voltage side of distributing stations more simple methods of construction may be used where the size of the voltage warrants. In the case of step-up substations the voltage on both the high and the low voltage sides of the transformers is usually so high as to require the installation of high voltage apparatus, though with differing insulation, spac-

ing of the wires of a circuit, etc. In the case of the outdoor substations

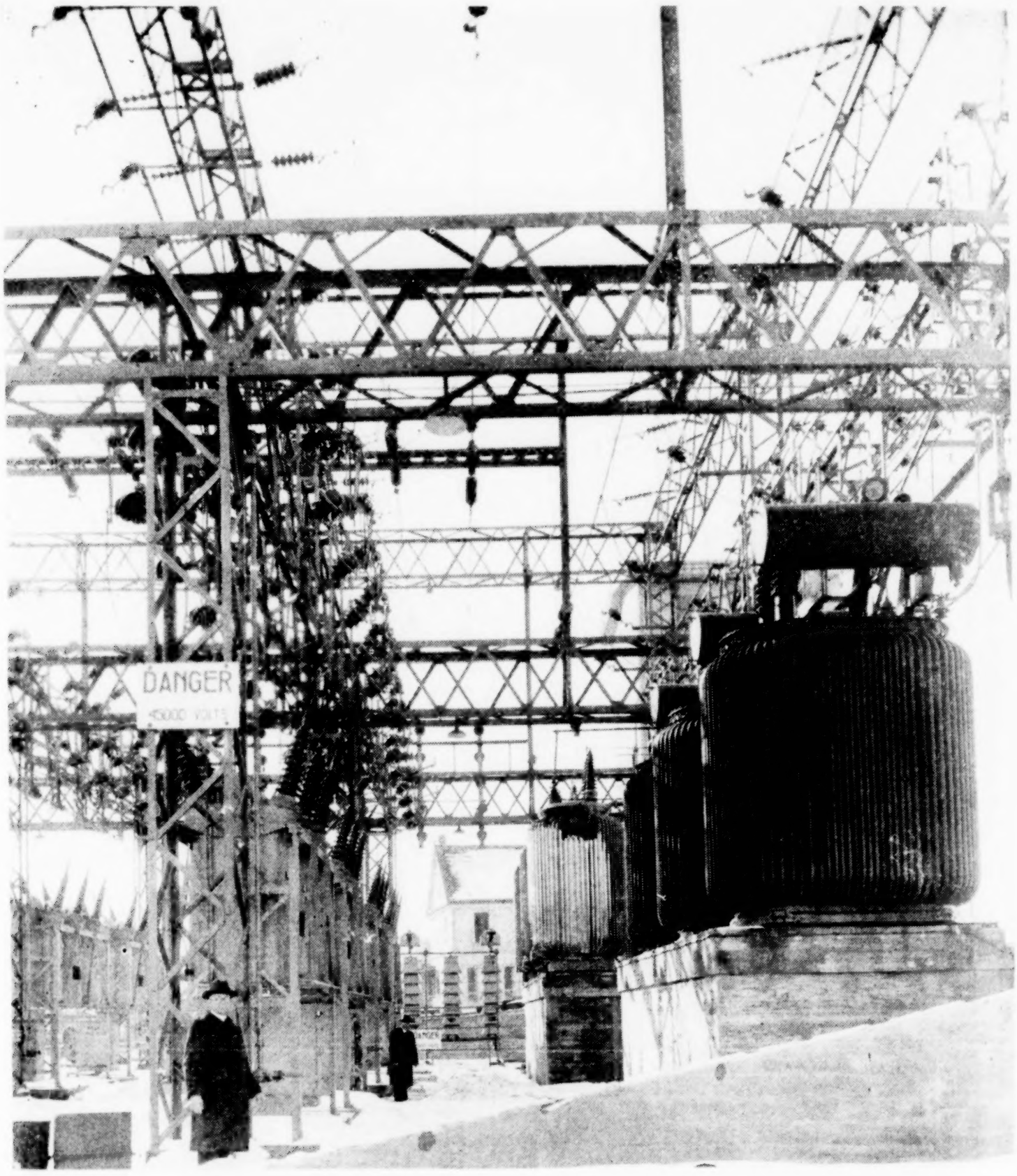

FIG. 15. Outdoor transformer substation. The transformers are at the right, the oil switches in the middle and left, and a bank of lightning arresters at the center rear.

methods are used which are much the same in principle as those used in substation buildings, except that the apparatus must be so installed and insulated that it will not be interfered with by weather conditions. In some cases the substations, especially those built outside, are operated partly from a control switchboard located at a distant point. When they are completely

operated by a distant control they are called *remote control substations.*

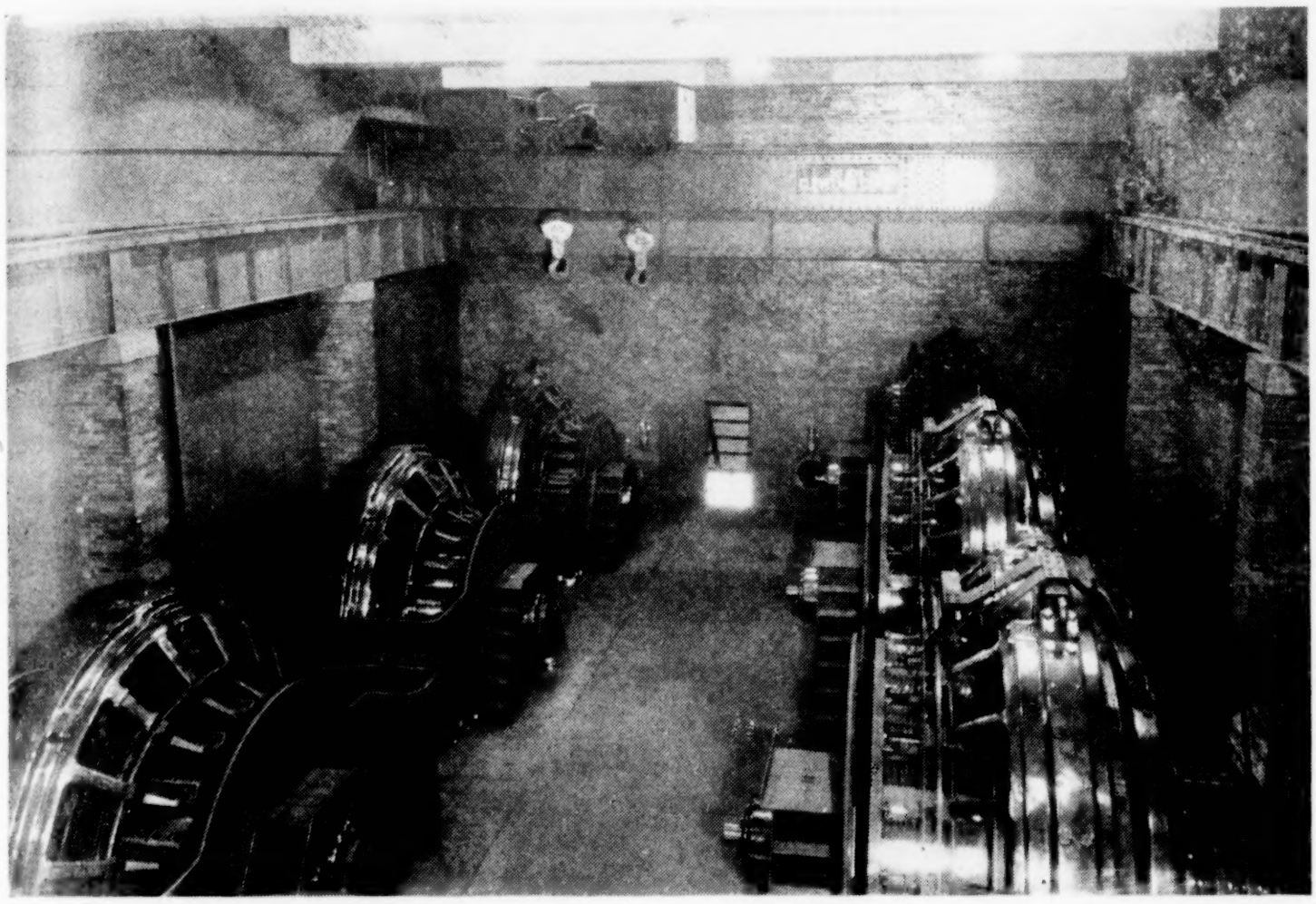

FIG. 16.—View of a rotatory converter room of a substation. Alternating current is received at the outside ends, and direct current at the inside ends of the machines.

Transmission Lines

The term transmission line is usually applied to wires or lines which run from a generating station or the high voltage side of a step-up substation considerable distances to distributing stations, at places or towns where the power is to be used. The transmission lines, as was said earlier, may vary in voltage, depending upon the distance and the amount of power to be transmitted, from a few thousand volts up to as high as 220,000 or more volts, and in distances from a few miles to hundreds of miles. The short, low voltage and less important lines are sometimes supported on wooden poles, while the long, heavily loaded high voltage lines are today quite universally supported on structural steelwork towers. These wires are of copper, aluminium, or copper clad steel, as was earlier indicated, depending on the character of construction, the conditions to be met, economy, etc.

The insulators for such lines are usually of porcelain and are so shaped with petticoats that their under sides remain dry and preserve an insulation resistance for preventing leakage of current even in very stormy weather, or, for some situations, they may consist of a series of disks of special conformation, one above the other. The number and the size of the petticoats used on insulators are dependent on the voltage; an insulator for 10,000

volts would break down or permit the current to leak over its surface if used on 220,000 volts. Such lines are generally divided into sections, so that when work is to be done on a section it can be cut off from the rest of the line. The disconnected section is usually grounded for further protection.[4] The wires of the portion of a circuit comprising a transmission line are separated varying distances depending on the voltage. In some cases the spacing is a dozen feet or more.

Underground transmission conductors are insulated usually with paper in many tight wrappings, and this insulation is encased in a waterproof covering of lead. Frequently all of the conductors of a circuit—two, three, or four—are placed within the same sheathing, and for some work concentric cables are used, in which a central insulated conductor is surrounded by another. Where the cable is exposed to mechanical injury it may also be armored with steel wire or ribbon. The cables are drawn into *underground conduits* made of concrete or protected by concrete, and at suitable distances *manholes* are placed in which the ends of the cable lengths may be spliced together. Here again the high voltage cables are killed and grounded before work is done on them. A recently installed cable for a circuit of 132,000 volts uses conductors with a hollow center which contains oil. This enables the insulation of the cable to be maintained at a safe value.

As much care is taken to protect workmen when working in manholes as is used in power stations. One precaution is to tag or mark all cables in manholes or junction boxes in such a way as to distinguish each one and show its place of origin and ending. There are also kept available diagrams of manholes, etc., which show the exact place that each cable occupies. Before workmen are permitted to work on a high voltage cable it must be made dead by isolating it from points of power supply and careful tests are made by the operators in charge to prove that this has been done. Then the workmen, before cutting the lead sheath and insulation of the cable, make further tests on it at the manholes to give added assurance that it is not alive.

Lightning, and high voltage induced surges due to lightning, have introduced difficult hazards with which the electric power industry has had to cope. They have, however, been given careful scientific and practical study, with the result that the electrical systems are now reasonably well protected by lightning arresters, with regard to the hazard to property, and also to life, arising from these causes. Figure 15 shows in the background a bank of lightning arresters. The fundamental purpose of the lightning arrester is to carry the lightning or high voltage surges safely to the ground without at the same time setting up a short circuit path for the power current to follow.

Primary and Secondary Distribution

The term electrical distribution is usually applied to the distribution of electric power within a single city or restricted area fed by one or more distributing stations or directly from a power plant located in or close to the area.

[4] See p. 545.

From the alternating current distributing stations it is common to carry alternating current feeders of medium voltage, possibly from 2,000 to 4,000 volts, to mains which run along the streets and from which service taps or branches are taken. This part of the system is commonly called the *primary distribution*. The voltage is again reduced by transformers placed on poles where the lines are overhead, and in manholes or basements where they are underground, to possibly 110 or 220 volts for entrance to groups of houses. This part of the system is called the *secondary distribution*.

If the distributing station is of rotary converter type, the direct current power sent out will be at about the voltage at which it is to be utilized and delivered to customers, and low voltage direct current feeders from the distributing station may be tapped directly to an interconnected network of mains which covers the district to be supplied, and from which the service taps are taken to the buildings using the power. (This network principle may also be used in alternating current distribution.) In underground distribution the construction is much the same as for underground transmission spoken of earlier; the feeders, mains, and service taps are lead covered

FIG. 17.—View of a street service box, with a man donning rubber gloves to start work on the connections.

cables which are drawn through underground conduits and the mains pass through junction boxes at points where the service taps to buildings are to be connected. (See Fig. 17 showing a workman about to make a service tap on an underground low voltage main at a junction or service box.) Secondary networks may be fed by several substations.

FIG. 18.—Insulated tools, goggles, first aid equipment, test lamps, etc.

Electrical Utilization

In the ordinary house the conducting wires are usually thoroughly insulated with rubber and braiding and are commonly pulled into iron pipe or cement conduits. Wires insulated and armored with a flexible metallic covering, sometimes called flexible conduit, are also extensively used.

The electrical industry, as far as possible, has standardized upon fittings and appliances to prevent customers from getting shocks and to avoid fires. In bathrooms, cellars, and other damp places porcelain sockets are largely used, and for other appliances, such as irons, grills, fans, washing machines, etc., insulated plugs may be inserted into wall sockets which are also insulated and arranged so that the possibility of the user's getting into contact with the live wires or current carrying metal parts is reduced to a minimum. Much care and attention have been given to the use of flexible cord or other movable or temporary unarmored wire to insure its being of high quality, as the insulation of such movable wires may deteriorate. Deteriorated insulation may cause electric shocks to users of appliances, and by causing short circuits the wires may become overheated or cause flashes with resultant burns and fires.

The industry has also used its influence to prevent dangerous appliances from being sold to the public. In this it has been substantially aided by the National Fire Protection Association.

It is usual to connect conduits and the metal parts of stationary appli-

nces, other than the conductors, to *ground*, by means of bonding to water pipes or otherwise making good contact with the ground. This is a protection against the hazard of shocks or fire due to faulty insulation. When, in this case, a conductor gets against an exposed metal part no voltage can exist between it and the ground to which it is already connected. The grounding of high voltage circuit breakers and other apparatus or lines, referred to heretofore, when work is to be done upon them, gives protection in the same way, for should the apparatus or line be put in contact, by mistake, with a source of high voltage it cannot create a voltage between it and the earth and the workers will therefore not be injured. It is common for secondary distributions to be grounded on one side, or at a point of neutral voltage, which is a further safeguard. In this case it is good practice to connect the more exposed terminal of an appliance, such as a lamp socket, to the grounded side of the circuit; and the tendency is growing in the direction of running a grounded wire to the metal parts of portable tools, etc.

FIG. 19.—Rubber protectors, blankets, etc., used in overhead construction. The linemen are wearing their safety and body belts and climbers.

TOOLS AND RULES

Precautions are taken with thoughtfulness, in the electrical industry, to protect workmen from dangerous contact with live electric conductors. Some of these have been explained earlier.

Rubber gloves are used for work on circuits of dangerous voltage and employees are required to wear them whenever there is a possibility of making a high voltage contact accidentally

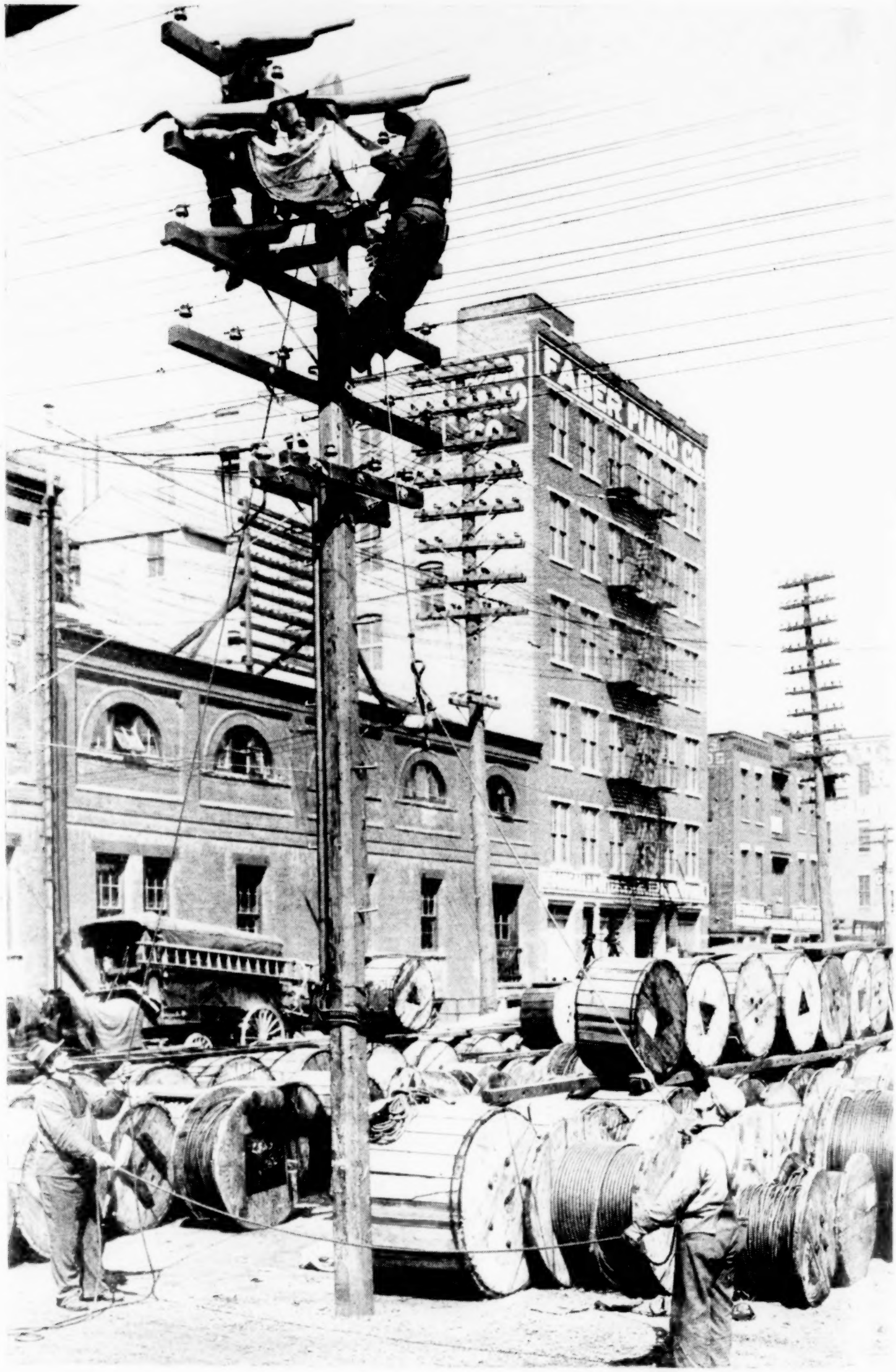

FIG. 20.—Rubber protectors and blankets used temporarily to protect linemen from wires adjacent to their work, and a canvas solder catching bag in place. One of the linemen's safety belts can be seen in place around the pole.

or otherwise. The rule is never to work on live circuits unless absolutely necessary. Gloves are often initially tested to withstand 18,000 volts and are discarded when they show imperfections or deterioration. Inspection and test of the gloves are made periodically at short intervals.

Tools fitted with insulated handles or otherwise especially arranged are provided further to protect the workman against accident. In Figure 18 is shown a group of such appliances together with first aid kits, goggles, and test lamps. For men working on outside lines "pigs" or protectors, blankets, and other rubber appliances are provided for covering live wires adjacent to those upon which the work is being done. Figure 19 shows a group of rubber coverings, and Figure 20 shows a line wire thus protected. It is impossible even to enumerate herein the long list of material safeguards, danger signs, etc., which have been gradually and carefully developed.

In addition to the provision of safeguards, the electric power industry has given much time, thought, and attention to developing safety rules and practices. These are largely embodied in the National Electrical Safety Code and the National Electrical Code of the National Board of Fire Underwriters, which were developed with the co-operation of members of organizations such as the National Bureau of Standards, the American Engineering Standards Committee, the National Fire Protection Association, the National Electric Light Association, and the American Institute of Electrical Engineers. From these codes the companies use such rules as may be needed for safe operation and, where necessary, make additions to meet special local conditions.

The National Electrical Safety Code treats voltages up to 750 volts, from that up to 7,500 volts, and all above, in three general classes, because of apparent varying danger to life and property and the varying requirements which must be met for the proper spacing of wires, character of insulation, and other measures for the protection of employees and the public, the service, and property.

In addition to such precautions as relate to safeguards, the electric power companies give careful attention to the selection of employees who are capable of performing the service required of them, and then to giving them continuous and extended training. As a rule, this training extends over a period of years while the employee advances from the lowest rank of helper to that of skilled workman. As an essential part of this training, it is now quite universal to give periodic instruction to employees in the Schäfer prone pressure method of resuscitation.

BOOK REVIEW

VENTILATION AND HEALTH. THE NEW HYGIENE OF FRESH AIR. By *Thomas D. Wood*, A.M., M.D., Professor of Physical Education and Adviser in Health Education, Teachers College, Columbia University, New York; Author of "Health and Education," and "The Child in School," and Co-Author of "Byways to Health," etc.: and *Ethel M. Hendriksen*, Former Executive Secretary, Tuberculosis and Public Health Association of Rochester and Monroe County, New York. Cloth. Pp. xvii, 210 with glossary and index, illustrated. New York and London: D. Appleton & Co., 1927.

The JOURNAL OF INDUSTRIAL HYGIENE reviewed this book in its August issue (p. 369).

Professor Drinker regards the authors as uninformed about what is being done in the ventilation field because they failed to describe the studies which a few universities and the United States Bureau of Mines have made and are making on the effect of temperature and other air conditions on the human body. The authors fully appreciate the value of these studies but recognize a distinction between this type of physiologic research and research in actual methods of ventilation. Their reference was to the latter type of investigation when the statement was made in the book that "no university or medical school in the country conducts research work in ventilation."

Since the publication of "Ventilation and Health," Johns Hopkins University has completed a study of a popular method of mechanical ventilation known as the unit system and has found it inadequate as used in the schools of Baltimore. This, according to available information, is one of the first scientific studies which a university has made of a system of mechanical ventilation, although the New York State Commission on Ventilation investigated mechanical ventilation of the plenum-fan type and found it less satisfactory for schoolroom use than window ventilation with gravity exhaust. The work of the New York State Commission on Ventilation may be regarded as the first and most important study of methods of ventilation undertaken in this country. Too little attention has been paid by universities to this important work.

The authors believe that there is nothing inaccurate in the description of the hot wire anemometer in "Ventilation and Health." Dr. Vernon has supplied the authors with a more detailed description of this new type of instrument for the second printing of "Ventilation and Health" which will soon be available.

The technical and typographic errors mentioned by Professor Drinker are acknowledged as such by the authors and were recognized as soon as the book appeared. Although it is believed that they are for the most part of so obvious a nature that the intelligent reader would recognize them as mere slips, attention is being called to the errata in the remaining copies of the first edition. It goes without saying that the errors will be corrected when the book is reprinted.

THOMAS D. WOOD,
ETHEL M. HENDRIKSEN.

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This is a subject index to all the reading matter in the JOURNAL OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word, with the following exception: "Book Notices" are indexed under this title on page 551. The name of the author follows the subject entry in parenthesis.

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OF

INDUSTRIAL HYGIENE

SUPPLEMENTARY TO

THE JOURNAL OF INDUSTRIAL HYGIENE

EDITORS

DAVID L. EDSALL, M. D., S. D., United States
EDGAR L. COLLIS, M. D., M. R. C. S., Great Britain

VOLUME IX
JANUARY, 1927—DECEMBER, 1927

PUBLISHED BY
HARVARD SCHOOL OF PUBLIC HEALTH
Boston, Mass.

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ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

VOLUME IX JANUARY, 1927 NUMBER 1

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GENERAL

A NOTE ON THE MEDICAL AND HYGIENIC ORGANIZATION OF THE RAND MINES, LTD., TRANSVAAL, SOUTH AFRICA. *A. J. Orenstein. Abstr. as follows from Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg., 1925, vol. 29, pp. 268–273, in Bull. Hyg., April, 1926, vol. 1, p. 317.*

This note deals with the eighteen gold mines owned by the Rand Mines Limited which employs about 80,000 natives (Bantus) and 10,000 Europeans. About half the Europeans and all the natives live permanently on the mine properties. Prior to 1912 the native annual death rate was 40 per thousand, and pneumonia caused about one-third of the deaths. Sir Almroth Wright, and later General Gorgas, were asked to advise on methods of controlling the pneumonia. The former advised prophylactic inoculation; the latter, general sanitary improvements. Both plans were adopted.

In May, 1914, the author undertook

the organization of the plan of campaign. Housing was tackled first. Separate sleeping compartments for each individual were substituted for the long shelves on which the natives formerly slept in rows. Central main hospitals and outlying hospitals for minor ailments were instituted, with adequate staff of doctors, nursing sisters, and native girl assistants.

The prevalent scurvy was dealt with by rearrangement of the dietary after research on local food substances. It was found that intravenous injection of neutralized orange juice was the most effective means of treatment, causing rapid recovery even in severe cases. Since 1917 all new arrivals have received Wright's polyvalent pneumococcal vaccine made by Lister; its value is not yet definitely determined. Tuberculosis mortality is now below 1 per thousand instead of 3 as in 1910; pneumonia mortality has fallen from 12 to 3 per thousand; and the total death rate from diseases from 40 to about 10.

The sanitary department supervises hygiene above and below ground, sewage and refuse disposal, all buildings which may affect health, and all first aid and hospital treatment. The superintendent of this department represents the company in all dealings with the government in health matters, and in all his duties he is responsible directly and only to the chairman of the company. Propaganda work is carried on among the employees by means of lectures, cinemas, and a free monthly magazine.

The author concludes with the reflection that the good results achieved are attributable not to any new and dramatic discovery, nor to any novel way of applying old methods, but to the careful application of well-known principles in well-tried ways.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

GAS MASK FOR PROTECTION AGAINST AMMONIA GAS. *A. C. Fieldner, S. H. Katz, and H. W. Frevert. U. S. Bur. Mines, Rep. Investigations, Serial No. 2750, May, 1926, pp. 3.*

This paper describes the tests conducted by the United States Bureau of Mines on the GMD ammonia gas mask, manufactured by the Mine Safety Appliances Company, Pittsburgh, Pa.

This ammonia gas mask, which forms a pocket over the face and allows breathing through the nose, consists of a face-piece with non-shatter eyeglasses; this is attached by means of a corrugated rubber tube to a canister supported on the wearer's chest by a harness. The canister is green in color and is of tinplate construction. It has a disc valve at the bottom to prevent exhalation through the canister. The filling of the canister consists of a specially impregnated activated charcoal, about 750 c.c. in volume and weighing about 520 grams. This material is supported above the check valve by a dome of wire screen covered with toweling. Above the granular material is a filter of absorbent cotton between wire screens, and all materials are held firmly in place by pressure from strong springs.

The entire equipment satisfactorily passed the Bureau of Mines Schedule 14A test, which includes chemical tests for life and efficiency of the canister, tests on men both exercising and at rest, and tests of resistance to air flow (*i.e.*, resistance to breathing). The mask was approved for concentrations of ammonia not exceeding 3 per cent. It is noted that "the masks protect in any concentration that can be borne readily by the skin." In the man tests, the concentration of ammonia (2 per cent. and less) was sufficient to cause severe skin irritation. The smell of ammonia warns the wearer in ample time that the contents of the canister need renewal.—P. D.

THE DETERMINATION OF TRACES OF CARBON MONOXIDE. *H. Davies and H. Hartley. Jour. Soc. Chem. Indust., June 4, 1926, vol. 45, pp. 164T–168T.*

The authors describe experimental work undertaken to determine the precautions necessary for detecting small traces of carbon monoxide by using the reaction between this gas and heated iodine pentoxide. The reaction is very sensitive and a special type of apparatus and procedure must be adopted.—E. L. C.

A CONVENIENT APPARATUS FOR THE DETERMINATION OF LOW CONCENTRATIONS OF CHLORINE IN CHLORINE-AIR MIXTURES. *J. H. Yoe. Abstr. as follows from Jour. Lab. and Clin. Med., 1925, vol. 10, pp. 1041–1045, in Chem. Abstr., June 10, 1926, vol. 20, p. 1732.*

A new apparatus for collecting chlorine-air mixtures and tables for estimation of chlorine by the sodium thiosulphate and iodine method are described.—P. D.

GASES FROM BLASTING IN HEAVY SULPHIDES. *E. D. Gardner, G. W. Jones, and J. D. Sullivan. U. S. Bur. Mines, Rep. Investigations, Serial No. 2739, March, 1926, pp. 8.*

"Large amounts of sulphur dioxide may be generated in blasting in heavy sulphides, particularly in dry working places where dust has settled on the walls. There also appears to be danger from sulphide dust explosions when blasting in such places.

"The deadly gas, hydrogen sulphide, is also likely to be produced in blasting in heavy sulphides. Water in drill holes appears to increase the amount of hydrogen sulphide generated when blasting in such places.

"Ventilation currents should be arranged in such a manner that there is no possibility of men getting caught in gases from blasting in heavy sulphides."

In addition to the above conclusions, the analyses given indicate that the concentration of hydrogen sulphide present after blasting falls off gradually because of chemical decomposition. The physical chemistry of the several reactions under discussion is given briefly.—P. D.

ANILINE SHOE DYE POISONING. *A. J. Patek. Abstr. as follows from Jour. Am. Med. Assn., March 27, 1926, vol. 86, pp. 944–945, in Chem. Abstr., July 20, 1926, vol. 20, p. 2415.*

A report of three cases is given in which the dye is stated to contain 36.58 per cent. of aniline.—P. D.

CYANIDE POISONING FROM SHOE CLEANSER. *H. Ullmann. Abstr. as follows from Deutsch. med. Wchnschr., March 12, 1926, vol. 52, p. 451, in Jour. Am. Med. Assn., May 15, 1926, vol. 86, p. 1589.*

Ullmann investigated the cause of general malaise and headaches in several girls employed in a shoe store. He found a considerable quantity of cyanide in a fluid shoe cleanser, manufactured by Whittemore Brothers in Boston. A mouse placed in a jar containing 1 c.c. of the fluid died within two minutes. He suggests an international prohibition of similar preparations.—K. R. D.

HEMOCHROMATOSIS AND CHRONIC POISONING WITH COPPER. *F. B. Mallory. Arch. Int. Med., March, 1926, vol. 37, pp. 336–362.*

This paper was the Tenth Mellon Lecture before the Society for Biological Research of the University of Pittsburgh School of Medicine. The conclusions are given as follows:

Evidence is slowly but steadily accumulating in favor of the view that chronic poisoning with copper causes the symptom complex known under the different names of hemochromatosis, bronzed diabetes and pigment cirrhosis.

Copper is an exceedingly useful and indispensable metal in many ways but it should not be employed where it may come in contact with foods or drinks, especially if they contain acids of any sort, because it is so readily dissolved by many of them. This would exclude its use for cooking utensils of any sort, for shakers of cocktails and acid drinks, and for the worms of the condensers in stills.

Its use in pipes for drinking water and for hot water heaters is probably without danger.

IMPOTENCE OF WORKMEN. *Japan Letter, Jour. Am. Med. Assn., June 19, 1926, vol. 86, p. 1924.*

Dr. Shogo Koinuma, medical expert of the home department, made an investigation of health conditions of 637 families of workmen in big storage battery factories in Osaka, Kyoto, and Yokosuka, and in some big potteries. The statistics concerning 298 families of storage battery employees show the effect of lead intoxication on generative capacity:

Effects	*Families*	*%*
170 workmen engaging in lead work:		
Sterility	42	24.7
Premature or stillbirth and miscarriage	26	8.2
Death of nurslings	70	24.2
128 workmen not engaging in lead work:		
Sterility	20	14.8
Premature or stillbirth and miscarriage	10	2.8
Death of nurslings	66	19.2

—K. R. D.

RULES AND REGULATIONS GOVERNING THE HANDLING OF ETHYL FLUID. *Issued by Dr. R. A. Kehoe, Medical Director Ethyl Gasoline Corporation, June 30, 1926, pp. 7.*

This is a set of rules and regulations for refineries and depots where ethyl fluid is mixed with gasoline in commercial proportions. The report is divided into three general heads:

I. General Rules to be Given to Employees

Ethyl fluid is poisonous when it enters the body; it may enter by contact with the skin, through the mouth, or by inhalation through the

lungs. It is essential that workers be equipped with a separate and complete change of working clothes, including boots or shoes, rubber and canvas gloves, and a rubber apron, and that these clothes should be laundered daily. It should be insisted upon that, at the end of the working period, each employee bathe thoroughly with soap and warm water. He should be supplied with an individual cloth towel. Washing with kerosene and then with soap and water should follow immediate contact with ethyl fluid. Respirators containing a medium of activated charcoal are to be used whenever the vapor of ethyl fluid is present in the air. Mixing operations shall take place in an open place, or in one provided with forced down ventilation, and on a floor which can be flushed immediately in case of a spill. The same men should be employed on each operation at all times.

II. Care of General Health

A bad cold or any other sickness is a legitimate reason for reporting off duty. "Sickness of any kind is reason enough for not working with material containing lead." Workmen are urged to keep their teeth clean and in good condition.

It is to be noted that no periodic medical examination of the workmen handling ethyl fluid is mentioned.

III. Special Rules

No cars of ethyl fluid should be unloaded until they have been inspected for leaks and spills. In case these are found, they should be carefully cleaned up and the car properly ventilated until free of ethyl vapor.

Drums should be stored bung up and should be carefully inspected for leaks before storing.

Operations should cease immediately when leaks occur and repairs are to be made by service men. Spilling of ethyl fluid should be avoided and, if it occurs, the fluid should be either dissolved in kerosene and then flushed with water or else neutralized with kerosene containing 2 per cent. sulphuryl chloride or a thin paste of bleaching powder in water.

Skin contact with gasoline containing ethyl fluid is to be minimized to the lowest possible extent, although the report states: "There is *no* exposure to Ethyl fluid as a result of the inhalation of vapor arising from gasoline containing Ethyl fluid in commercially indicated concentration."—J. W. F.

DUST HAZARDS AND THEIR EFFECTS

YOUR FACTORY'S DUST PROBLEM AND HOW TO MEET IT. I; II. *K. D. Hamilton. Factory, March, 1926, vol. 36, pp. 446–449, 504, 570–578; April, 1926, pp. 650–654, 748–760.*

These are chapters 18 and 19 of the author's series on plant maintenance. They deal with the selection of proper equipment to solve the problem of dust in the various industries. Several photographs show types of actual installations.

The author appears to have had wide experience in the design, con-

struction, and care of pneumatic collecting and conveying devices, and the many practical points he discusses will be valuable to ventilating engineers, factory superintendents, and foremen who are interested in the problem of dust elimination.—C. P. Y.

USE OF METAL FILTERS FOR THE REMOVAL OF DUST FROM AIR. *M. Berlowitz. Abstr. as follows from Gsndhts.-Ing., 1925, vol. 48, pp. 397–403, in Chem. Abstr., June 20, 1926, vol. 20, p. 1923.*

The metal filter used in place of cloth filters for air filtration during the war is an extremely sensitive piece of apparatus, its efficiency varying with the load and the dust content of the air. It is suitable for use when the total dust content of the air to be treated is at least 1 mg. per cubic meter, and when an efficiency of dust removal equal to 80 per cent. is sufficient. Should a higher efficiency be required, the metal filter is used as a pre-filter to a cloth filter.—P. D.

OCCUPATIONAL INJURY FROM DUST. *F. Prinzing. Prophylakt. Med., Kharkov, March, 1926, vol. 5, p. 115.*

SOME PROBLEMS CONCERNED WITH THE DETERMINATION OF THE FINENESS OF COAL DUST. *E. F. Greig. Safety in Mines Res. Board Paper No. 25. H. M. Stationery Office, 1926.*

Important factors when examining the problem of coal dust explosions are the degree of fineness, the shape, and the distribution of particles in a dust cloud. These factors are of equal interest to those studying the dust problem from the viewpoint of inhaling dust. Various methods used for estimating the size and number of particles are critically presented. As the result of the discussion it is concluded that sieving methods are not sufficiently accurate; that air elutriation methods provide means of obtaining grades of dust of definite ranges of specific surface for the purpose of correlating specific surface and degree of inflammability of a dust cloud; that by a combination of elutriation, sedimentation, and microscopic examination, it is possible to grade the specific surfaces of dusts; and that other methods, of a more empirical nature, may be found useful for rapid determination and field use. The size of coal particles forming an explosive cloud appears to be greater than the most dangerous particles of silica dust, since few of the former are below 10 microns, and fewer still, if any, below 5 microns.—E. L. C.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

PREVENTION OF INDUSTRIAL ANTHRAX. *G. E. Duckering. Abstr. as follows from Jour. State Med., Jan., 1926, vol. 34, pp. 39–48, in Bull. Hyg., May, 1926, vol. 1, p. 348.*

The prevention of industrial anthrax should begin in the agricultural countries where the flocks and herds graze. The carcasses of animals dying of anthrax contaminate the soil and so perpetuate the disease among other herbivorous animals grazing

over the site of the interment, unless the carcass is completely destroyed by burning or otherwise. In primitive countries that precaution is seldom adopted, but the hair, hides, and other products are mixed up with sound material and marketed. In Australia and East Africa the infected localities are of small area and are mostly on old cattle tracks; but in the older countries, mainly Asiatic and North African, the soil is permanently and intensely infected, and very many animals die every year. In Australia, the Argentine, and elsewhere, vaccination of infected herds is compulsory.

All persons engaged in salvaging the carcass or subsequently in the distribution or manufacture of the products are liable to be infected. Regulations aiming at cleanliness and the prevention of dust during manufacture have proved incompletely effectual. Prevention is by prohibition of import of dangerous materials—which is impossible for this country—or by disinfection as by the Duckering process; this should preferably be done at the exporting port, but, failing international agreement on this point, at the ports of importation. Liverpool has been selected for the experimental station, which is under the charge of the author, and has proved highly successful.

SYPHILIS AMONG WORKERS IN FRANCE. *F. Jeanselme and Burnier. Abstr. as follows from Bull. de l'Acad. de méd., March 9, 1926, vol. 95, p. 214, in Jour. Am. Med. Assn., May 15, 1926, vol. 86, p. 1586.*

Jeanselme and Burnier compare the statistics of new syphilitic infections in France and in other countries the last six years. While the number of recent cases of syphilis has been decreasing in Belgium, Switzerland, Denmark, and Austria, it has been increasing among workers in France. This fact seems to be due in part to the afflux of foreigners and natives of French colonies. It is not the imported virus which is accused, since 82 per hundred of the newcomers contracted their syphilis in France. At the St. Louis Hospital, Paris, the new infections formed 50 per cent. of the total in 1919; then dropped to 31 per cent. in 1923, and climbed to 60 per cent. in 1925. Another factor in the increase is the tendency of French physicians to replace arsphenamine by bismuth, which is considered by Jeanselme and Burnier as less effective in treatment of syphilis.—K. R. D.

DOES THE CHEMICAL INDUSTRY INVOLVE OCCUPATIONAL RISK AND INJURIES THAT INFLUENCE UNFAVORABLY THE DEVELOPMENT AND PROGRESS OF TUBERCULOSIS? *W. Hergt. Zentralbl. f. Gewerbehyg., Jan., 1926, N.S. vol. 3, pp. 10–13.*

Immunity from the danger of tuberculosis is dependent on the bodily powers of resistance, which vary in individuals, and in each individual according to his physiologic condition at any given time. Consequently such factors as environment, nourishment, housing, living, and working conditions are of considerable importance.

From two sets of statistics, one for the year 1908 and the other covering a period from July 1, 1922, to Dec. 31, 1924, interesting comparisons are made between various occupations in regard

to the percentage of deaths from tuberculosis. Of those quoted, the lowest percentage was found among workers in the chemical industry. Other statistics give similar results. In this connection, consideration must be given to the accepted fact that work in this industry is less severe than in certain others.

The inhalation of irritating gases has been held responsible for certain cases of tuberculosis, but this is disputed by Dr. Hergt. He further maintains that the occasioned "chemical bronchitis" can protect against tuberculous infection and can limit the area of already acquired infection, and he supports his contention with illuminating statistics. Also he finds that acute poisoning has hardly any significance in causing latent tuberculosis to become active. Experiments with rabbits that had been given small doses of nitrate of lead in order to produce chronic lead poisoning demonstrated that in the matter of spread of tuberculosis no difference could be found between those that had been so treated and those that had not. Kisskalt, who conducted these experiments, believes that the large number of tuberculous cases among lead workers is not to be ascribed to the lead itself but to some other factors. Dr. Hergt prefers to leave the matter undecided. He does not claim that the riddle of immunity or predisposition to tuberculosis has been solved by these experiments, as there is no proof that the results would be the same with human beings. Furthermore, this artificially produced tuberculosis in animals is general, and manifests a character different from the forms of tuberculosis found among human beings. Final judgment should be withheld until more systematic research has been conducted.

What has been said of chronic lead poisoning applies equally well to other chronic poisonings, such as are produced by mercury and by nitro and amido substances. The fact remains that conclusions arrived at concerning the influence of these conditions on pulmonary tuberculosis are for the present mere conjecture. Personally, Dr. Hergt does not believe that chronic aniline or nitrobenzol poisoning, for example, can stir latent phthisis into activity. His belief is founded on his experience with many aniline workers.

Dr. Hergt's conclusions are that statistical research has proved beyond a doubt that the chemical industry is, in the matter under consideration, in a better position than most other industries, and that it presents no specific occupational risk with regard to an increased tendency to tuberculosis or an unfavorable development of an already existing case.—A. W. N.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

MITES AND OCCUPATIONAL DISEASES. *A. G. G. Thompson. Abstr. as follows from Jour. State Med., 1925, vol. 33, pp. 419–427, in Bull. Hyg., May, 1926, vol. 1, p. 398.*

This is a useful, if discursive, com-

pilation introducing the medical officer of health to an assemblage of minute and ubiquitous creatures of which the very existence is generally overlooked, although a knowledge of them, and of their morbific activities in occupations connected with the handling of foodstuffs and raw products, will often save the medical officer from foolish perplexity and even anxiety. The author mentions Demodex, which though harmless to man is by no means so to animals—and to animals used as food: the food-mites (cheese-mite, flour-mite, sugar-mite, dried-fruit-mite), none of which, however, restrict their attentions to the stuffs from which they take their insignificant names; the harvest-mites (Trombidiidae) whose larvae are found—and may be a nuisance, or even a danger—in any part of the world in the harvest season; the "red-spiders" (Tetrarhynchidae); the Eupodid Tydeus, infesting cargoes of guano; the furious little Pediculoides (Tarsonemidae) normally parasitic on the caterpillars of grain-moths; the fowl-mite (Dermanyssus) and the rat-mite (Liponyssus); and he also gives a side glance at Pneumonyssus, although it has not been known to touch the lungs of man. All these, with the last-named exception, may affect man, and in the case of a number of men handling foodstuffs and raw material in bulk the trouble may take a sort of "epidemic" form. The itch caused by their attacks is of a most distracting kind, the attendant rash is sudden in appearance, there are no signs of a burrow like that of the common scabies-mite, and the mites are often particularly difficult to find.

OCCUPATIONAL DERMATITIS FROM WOOD TURPENTINE. *C. P. McCord. Jour. Am. Med. Assn., June 26, 1926, vol. 86, p. 1979.*

The author reports two outbreaks of wood turpentine dermatitis in two unrelated industries but in each of which distilled wood turpentine is used. The skin lesions have no specific characteristics but resemble the dermatitis seen from a great variety of chemicals, such as naphtha and benzene.

The author believes that permanent freedom from this hazard is dependent on provision in the distillation process for careful fractionization, in order that the numerous skin irritants in the mixture from which the wood turpentine is derived may be kept apart from the relatively harmless terpene oils.—K. R. D.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

VALUE OF HUMIDIFYING METHODS IN EXPLOSION PREVENTION IN COAL MINES. *D. Harrington. Abstr. as follows from Tr. Am. Inst. Mining and Metall. Eng., 1925, vol. 71, pp. 1185–1203, in Chem. Abstr., June 10, 1926, vol. 20, p. 1907.*

Harrington strongly advises both sprinkling and rock dusting. If efficient sprinkling is not done at the face, not only will ignitions be made easier and more frequent, but also the coal from dry "bug dust" blasting, shoveling from the face, and from the loaded

cars, and the bottoms of empty cars, as well as from coal spilled on roadways, will, within a very short time, cause rock dusted ribs, floors, and timbers of entries, abandoned workings, etc., to be so covered with fine dry dust as to be easily available for feeding flame and propagating explosions. Twenty-five per cent. of the dry dust settling out of the air of some of our western mines mixed with 75 per cent. of rock dust will readily propagate an explosion, and even 20 per cent. of that in some mines may do so. Water at the working face also reduces the danger of dust, even with a high silica content, to health.—P. D.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Further Evidence That Small Quantities of Copper, Manganese and Zinc Are Factors in the Metabolism of Animals. *J. S. McHargue. Am. Jour. Physiol., July, 1926, vol. 77, p. 245.*

Rats confined to a synthetic diet and under conditions that were the best that could be improvised at the time gave results which the author interprets as indicating that compounds of manganese more definitely and possibly copper and zinc also have important biologic functions in the animal metabolism. Moreover it is assumed that the compounds of these elements as they occur in the natural state in green leaves and in seeds of mature plants and the vital organs of animals have a much more active biologic potency than could be expected from feeding equal proportions of a crystalline salt of these metals in a synthetic diet.—K. R. D.

Some Experiments in Vocational Psychophysiology. *L. Walther. Internat. Labour Rev., July, 1926, vol. 14, pp. 55–71.*

The author, in an excellent introduction, objects to separating mental from physical activity, because man is a psychophysical apparatus. Occupational activity and fatigue always concern both sides of human nature. Training, motion study, rhythms of work and rest—all have these two aspects. Experiments, based on this principle, are instanced. Two are examples of vocational selection concerned with making paper bags and with filling coffee bags by machinery. One example in vocational training is taken from teaching train drivers, which reduced by 65 per cent. the accidents on the Berlin tramway system.

The value of motion study for doubling or tripling output without any increase in fatigue is illustrated from a special process of covering a box with paper; here the point is stressed that the modern aim should be to train artisans, rather than to hire factory operatives. Susceptibility to fatigue varies with individuals; the rhythm of production should vary similarly. The value of laboratory research is great, since a workshop, governed by the need for output, cannot become a laboratory; but research should be conducted as far as possible under in-

dustrial conditions. Instances in point are given of the empirical use of rest pauses which increased output; the optimum break was not determined. The article exhibits methods which insure an increase in production, while at the same time they effect a real saving in human energy.—E. L. C.

WOMEN AND CHILDREN IN INDUSTRY

RECREATION FOR WOMEN EMPLOYES. *R. I. Stone. Indust. Psychol., April, 1926, vol. 1, pp. 262–264.*

The proper use of leisure time by the girl in industry is highly important in her development into useful, healthy, and wholesome womanhood. She is often indifferent to the efforts of others to interest her in specific forms of recreation, and in following her own impulses frequently brings trouble upon herself and her family and becomes a social problem. To a great extent, modern industry has deprived the worker of such essentials as fresh air and sunshine and of creative and muscular activities. This condition should be counteracted by a suitable recreational program, planned and supervised with due regard to the health of the individual and the needs of the group. Each person should be given a physical examination before enrollment in any activity.—A. W. N.

NERVOUS WOMEN IN INDUSTRY. *M. C. Jarrett. Indust. Psychol., April, 1926, vol. 1, pp. 271–276.*

Nervous women constitute a problem in industry. Nervous disorders manifest themselves in various forms and may appear in almost any sort of person. Peculiarities of conduct or character, physical ailments, may in reality be merely symptoms of some nervous or mental trouble. Two persons with the same type of mental disorder may behave very differently, while others may behave more or less alike from entirely different causes. It is important that the case be correctly diagnosed as early as possible, and treated to remove the cause and not merely the symptoms. Certain attitudes, while perfectly normal in healthy persons, when exaggerated or conspicuous may prove to be the outward sign of some inner conflict of emotions, resulting in a nervous condition. Southard's suggestion is recommended—"the mental hygiene working party," consisting of a psychiatrist, a psychologist, and a psychiatric social worker, who should operate for a certain period in an industrial plant. To render the plan less formidable to the ears of a conservative employer, these may be termed "a doctor with two assistants." All three are essential to an effective study and treatment of the conditions.—A. W. N.

WOMEN IN OKLAHOMA INDUSTRIES. A STUDY OF HOURS, WAGES, AND WORKING CONDITIONS. *U. S. Dept. Labor, Women's Bur., Bull. No. 48, 1926, pp. 118.*

WOMEN IN ILLINOIS INDUSTRIES. A STUDY OF HOURS AND WORKING CONDITIONS. *U. S. Dept. Labor, Women's Bur., Bull. No. 51, 1926, pp. 108.*

These reports present the results of

surveys carried on during the early months of 1924. Under the heading "Working Conditions" in both bulletins attention is given to arrangement of rooms, stairways, cleaning, heating, ventilation, lighting, seating; sanitation—drinking and washing facilities and toilets; and service equipment—lunch, cloak, and rest rooms; and, in the report from Illinois, also health equipment, this feature not being mentioned in the Oklahoma report. In the Oklahoma plants, to a considerable extent, no provision has been made for rest rooms; "in the state as a whole, standards of plant equipment affecting the convenience and health of the workers have not come up to what they should be."

The Illinois report states that in regard to the health equipment "the extent to which these needs had been met varied greatly throughout the plants visited. In some places a bottle of iodine and a roll of gauze seemed to be all that was thought necessary, whereas some larger establishments had well-equipped hospital rooms with a full-time doctor and nurse, who gave attention to general health as well as to emergency needs." —A. W. N.

WOMEN IN THE FRUIT-GROWING AND CANNING INDUSTRIES IN THE STATE OF WASHINGTON. A STUDY OF HOURS, WAGES, AND CONDITIONS. *U. S. Dept. Labor, Women's Bur., Bull. No. 47, 1926, pp. 224.*

This report presents the result of a survey made during the summer and fall of 1923 in the state of Washington and deals both with the local and with the migratory workers, the latter generally living in camps. The housing conditions vary greatly. While the sanitation of labor camps is under regulations "which have the force of law," yet they are not rigidly enforced. "Overcrowded conditions in bunk houses and tents prevailed." In many rooms there was but one window and frequently this could not be opened and shut. Many families slept on the ground on straw which they covered with a piece of old carpet or blanket. Toilet facilities were in many instances inconveniently located and used by too many persons. More than half the cookstoves were located in sleeping rooms. In the canneries and warehouses the report shows crowded conditions, and inadequate heating or none whatever in the chilly days of autumn. Further inadequacy is also reported of proper facilities for seating, bathing, or resting. The use of towels and drinking cups in common is too frequently found, notwithstanding its prohibition by the state. In the canneries "fruit poison" and "fish poison" were prevalent. Infection often causes loss of finger nail or may cause virulent blood poisoning. Tables showing the various kinds of disabilities and their causes have been furnished by the State Department of Labor and Industries.—A. W. N.

CHILD LABOR IN FRUIT AND HOP GROWING DISTRICTS OF THE NORTHERN PACIFIC COAST. *A. Channing. U. S. Dept. Labor, Children's Bur., Pub. No. 151, 1926, pp. 52.*

This report presents a survey of the work of children on fruit crops and hops in Washington and Oregon during the summer and fall of 1923. The housing and sanitary conditions are the same as those reported in Bulletin

Number 47 issued by the Women's Bureau (see preceding abstract). The children are employed chiefly in picking hops, berries, and small fruits. Prunes are generally picked from the ground, which is frequently damp and muddy after the autumnal rains have set in, and discomfort is occasioned from this cause as well as from the strained and cramped position in which the work is done. Long hours are also an unfavorable condition of the hurried harvest, though it is naturally for short periods. Some of the children suffered from a rash called "hop poisoning" and others complained of the acrid odor of the hops.

In some cases boys carried drinking water to the workers in pails and served it in tin dippers.

In most of the berry camps the sanitary conditions were good.—A. W. N.

INDUSTRIAL ACCIDENTS TO EMPLOYED MINORS IN WISCONSIN, MASSACHUSETTS, AND NEW JERSEY. *E. S. Gray. U. S. Dept. Labor, Children's Bur., Pub. No. 152, 1926, pp. 119.*

This report presents "the results of a study of industrial injuries to employed minors, with especial reference to the causes of such injuries and to their economic and social effects." The three states covered by the report "give their young workers a considerable degree of special protection. Each has a minimum age limit for the employment of children, prohibits their employment under specified ages in certain dangerous occupations, and does educational work looking toward the prevention of accidents through continuation schools which young workers are required to attend."

The report contains the state records of industrial (compensatory) accidents to employed minors, covering causes, location and nature of injury, extent of disability, occupational risk, compensation, and the results of these injuries after a period of from three to six years. One of the special dangers emphasized as existing for young workers is that of infection, which, it appears, develops in a large number of cases.—A. W. N.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

ATMOSPHERIC POLLUTION. WITH PARTICULAR REFERENCE TO THE EMISSION OF DUST BY INDUSTRIAL CHIMNEYS. *Abstr. as follows from Indian and Eastern Eng., 1926, vol. 58, pp. 59–60, in Chem. Abstr., July 20, 1926, vol. 20, p. 2381.*

The Davidson Patent Flue Dust Collectors (three types) are described. A dust collector of this system was first installed in the power station of the Shoreditch Borough Council, where exhaustive tests, extending over four months, were carried out. During that time 14 tons, 15 hundredweights dust and grit were extracted by the collector from the combustion products of 3,604 tons of coal, showing a great improvement upon anything previously accomplished. Results

have shown that practically 100 per cent. of the dust present in the flue gases can be definitely trapped, though the proportions of dust to the actual fuel fired have varied from 0.4 to 8 per cent., dependent on the conditions of firing, the quality of fuel, ash, etc. Another feature of the device is that even the finest dust particles are collected, which is an important factor as the smaller particles pollute a wider area of the atmosphere than the larger.—P. D.

Sanitary Survey of the Coal Mines of Alabama. *F. V. Meriwether. U. S. Bur. Mines, Rep. Investigations, Serial No. 2746, April, 1926, pp. 20.*

The United States Bureau of Mines has inspected twenty-one towns and four mine villages in the coal producing section of Alabama, which are representative of smaller and larger communities and of the various sizes of mines. Descriptions of the population and its constitution, of water supplies, of sewage disposal methods and sanitary department procedures in the control of communicable diseases are given. The report rates these towns between 43 and 95 (on what scale?) on their sanitary condition, with generally good water supplies but poor sewage disposal, since primitive methods are in wide use.

The comments throughout are of a very general nature, with almost no specific references or recommendations, and bear on the communities rather than on special problems of sanitation in the mines.—R. M. A.

Why Lose $\frac{1}{2}$ to $\frac{3}{4}$ of Overhead Light? *W. C. Randall. Factory, April, 1926, vol. 36, pp. 738–746.*

This is a brief résumé of the results of an investigation of the effects of saw-tooth lighting design on natural illumination, conducted by the Department of Engineering Research of the University of Michigan in collaboration with the Detroit Steel Products Company.

Various factors such as position of windows, slope, kinds of glass, glare reducers, and reflecting surfaces were all found to contribute to the securing of efficient industrial lighting; but, in the final analysis, keeping the glass clean is the primary essential. The authors state that "the ordinary twice-a-year window-cleaning program of industrial plants nullifies some of the refinements in saw-tooth lighting design and makes a mockery of the whole matter of overhead lighting."—C. P. Y.

Right Air for Workers Easily Secured. *T. D. Wood and E. M. Hendriksen. Indust. Psychol., Aug., 1926, vol. 1, pp. 525–528.*

This is a semipopular article advocating "good ventilation" and showing the benefits therefrom in reducing illness and lost time and in increasing working efficiency.—P. D.

A Rational Basis for Ventilation. *J. E. Rush. Jour. Am. Soc. Heating and Ventil. Eng., Aug., 1926, vol. 32. pp. 581–616*

This is a very readable review, fortified with numerous quotations and references.—P. D.

Conditioned Air Increased our Loom Production 25 Per Cent. *J. J. Robinson. Factory, April, 1926, vol. 36, pp. 724, 728, 732.*

This interesting article contains

actual data on the cost of operation of the air conditioning equipment in the weaving room of the John B. Stetson Company, Philadelphia, and the savings effected by the system. The result is a net increase of 25 per cent. in the production of the looms, brought about by preventing the breakage of threads through control of the air temperature and humidity.

According to the author, the introduction of the air conditioning system has in addition improved considerably the working conditions for the 130 people in the weaving room.—C. P. Y.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Medical Care of Industrial Workers. *Nat. Indust. Conference Board, 1926, pp. 112.*

This publication, which is one of the studies of health service in industry, is summarized as follows:

Organized medical service in industry is essentially a product of the last two decades in the field of industrial management, and it promises greater development in the future, than it has had in the past; yet, there is enough evidence at hand to justify the statement that the industrial physician is playing an important part in American industry. The general use of complicated and swift moving machinery, the industrial utilization of materials the handling of which involves potential hazards, and the bringing together of workers in large numbers in factories combine to heighten the risk of accidents and the danger of disease. Through the enactment of workmen's compensation laws legislatures have sought to ease for the worker the burden of the consequences of industrial accident and occupational disease. Industrial management in many cases has gone a step further. It has sought through provision of medical service in industry to lessen accidents and to prevent sickness, as far as this is possible, but when this is not possible, to mitigate their consequences through prompt attention to injuries and incipient disease.

The functions of medical departments in industry are, therefore, preventive and curative. The activities entrusted to them relate principally to:

Physical examinations of applicants for employment and of workers returning to employment after illness.

Periodic re-examination of workers in hazardous employments.

Treatment and redressing of injuries.

Diagnosis and treatment of minor medical cases as well as advice on medical problems.

Sanitation of workshops and maintenance of satisfactory working conditions.

Health education and accident prevention.

It should not be understood, however, that every medical department in industry performs or should perform each of these functions, although many of them include all. In smaller plants, treatment of injuries is often the only work done by the plant physician, especially if he devotes only part of this time to industrial service or visits a plant only on call. In larger plants, all or most of these activities will be found to be part of the work of the medical department and each belongs in any well developed program of medical service.

The number and composition of the personnel of medical departments depend in large measure upon size and character of the industrial establishment. In larger plants, physicians are generally employed on full time, though their services may be supplemented by others who give only a part of their time to the work. In many instances, all the medical work is in charge of a physician employed on a part-time

basis. However, even among the smaller plants investigated there are some in which physicians are employed upon full time. Physicians "on call" sometimes supplement the work of physicians regularly employed; sometimes, and especially in smaller plants, they are the only physicians employed.

Nurses play a prominent part in the work of medical departments. They are an important aid to the work of the physician in the more highly developed organizations, while in the smaller ones they are frequently the only full-time representatives of the medical department. In many instances, nurses are advantageously utilized in visiting sick and injured employees in their homes. Dentists are also regularly employed in some medical departments, in a few instances on a full-time basis, but more generally on part time. Oculists and other medical specialists are occasionally attached to medical departments on a part-time basis or as part of a consulting staff.

The physical examination of applicants is coming to be a common feature of employment management. As its purpose is more generally understood, the old-time opposition to such examinations on the part of the workers is disappearing. The object of such examination is not to exclude from employment persons with physical defects, but rather to select for them such occupations as are suited to their physical condition. It is to the interest of all concerned that no person should be set at work which tends to overtax his powers or aggravate his physical ailments. Through these examinations workers can be properly placed, and accidents resulting from physical maladjustment of employees to their jobs will not be invited. Nor will contagious diseases be given a chance to spread.

Among the 501 plants whose medical departments were investigated by the Conference Board, it was found that physical examination of prospective employees is carried on by more than half the number, that the time required for these examinations is generally from ten to fifteen minutes and that the percentage of rejections is very small. It was also found that there are fewer injuries per worker in plants requiring physical examination than in those which lack such requirement; on the other hand, medical cases are more frequent, which is probably an evidence of superior medical care rather than of greater prevalence of disease.

Physical examinations to which the Board's study related are not confined to applicants for employment. In most cases workers returning to the plant after an illness are re-examined to insure them work suitable to their physical condition. In many cases and as a preventive measure all employees are re-examined at regular intervals. The practice of having the higher executives submit to physical examination by the plant physician or by a physician in private practice is becoming more general and is considered an important measure of health conservation for those responsible for the success of the enterprise.

In the treatment of accident cases there is little, if any, difference in method between the work of the industrial physician and the private practitioner. However, the former has perhaps a keener realization of the fact that unemployment brings economic losses and he is, therefore, less disposed to coddle the patient. His aim is to restore at the earliest possible moment not only the patient's health but his earning capacity as well. Experience has shown that early return of the worker to his customary occupation, far from being of doubtful expediency, is in many cases highly beneficial from a purely medical point of view.

Industrial physicians generally and particularly those having the care of workers who are employed, as in mining and construction work, at some distance from the industrial dispensary, find that their efforts are greatly helped by intelligent first-aid service. Instruction in first aid has become an important duty of industrial management. To be effective, such instruction, while thorough, must be simple and confined to a comparatively few basic principles. It is essential also that first-aid equipments contain everything necessary for ordinary emergencies, but nothing that could not be handled by the layman without much danger. In most cases, the first-aid outfit must also be easily portable.

Treatment of minor medical cases by the medical department is desirable, especially

when it enables the injured or sick employee to continue at his work and prevents infection and more serious illness. Wherever possible, therefore, a plant medical department should be equipped with proper facilities for diagnosis. If diagnosis reveals the necessity of an extended treatment, the patient is generally referred to a private physician. An exception is sometimes noted in remote communities where both diagnosis and treatment are conducted in the plant dispensary and hospital.

Industrial physicians are not only doing much to relieve suffering and distress among employees of American industry, but they are making substantial contributions to the knowledge of the prevalence of accidents and of disease in industrial establishments. This has been accomplished through coordinating their efforts, and adopting uniform classifications and adequate and standardized medical records.

The plant physician is the natural adviser of industrial management in all matters relating to plant sanitation and the maintenance of satisfactory working conditions, and sometimes he is given direct responsibility for them. It is obvious that ventilation, illumination and the physical adjustment of the employee to the instruments with which he works are problems that require medical as well as engineering attention.

Good health is an asset of the worker that must not be carelessly dissipated. Aside from the employee's responsibility to himself and his family, the employer has a direct responsibility in seeing that this asset does not suffer impairment through adverse conditions to which the employee is exposed during working hours. But the employer is also interested equally with the employee that the latter come to his work in good physical condition; whatever he can contribute to this result by adequate health instruction of the employee is of mutual benefit. Accordingly, it is found that medical departments are often actively engaged in health education and in promoting personal hygiene.

Among other activities in which medical departments sometimes participate in supervisory or consulting capacity are safety work, employees' benefit associations and recreation activities, restaurant service, workmen's compensation adjustments, examination and, in some cases, treatment of employees' families.

The Conference Board's recent investigation of 501 plants with medical departments resulted in a series of interesting statistical tables in which the personnel of such departments and the main lines of their activity are fully displayed. Comparison with an earlier investigation of 1920 permits a view of the progress of recent years. Both studies show that the extent of medical care and supervision and the activities displayed depend in part upon the size of the establishment and in part upon the character of the industry, but they depend largely also upon the attitude of the industrial manager.

According to the Conference Board's studies, the cost of medical service in industry has risen from an annual average of $4.43 per employee in 1920 to $5.14 per employee in 1924. The cost varies with the different industries and with the size of the individual establishments; naturally it varies also with the effectiveness and the efficiency of the medical department. In these costs, the principal item is that of the salaries of physicians and nurses, which make up about two-thirds of the total expenditure for medical service. While this total in the plants investigated in 1924 exceeded five million dollars, it is small in comparison with the value of the annual output or the amount paid yearly in wages. The average yearly expenditure for medical service was found to be $1.03 for each $1000 of the value of products and $3.62 for each $1000 paid out in wages.

In protecting the worker from accident and disease by conserving his health, in adding thereby to the productiveness of industry, and in lessening the amount spent for public charity or private relief, medical service in industry has demonstrated its value. It is already widespread, but with a boundless field of further usefulness open to it, its full influence on industry and the community is yet to be measured. Herein lies the challenge to broad-visioned industrial managers and to efficient physicians in industry.

INDUSTRIAL HOSPITAL PRACTICE IS IN STATE OF FLUX. *F. L. Rector. Nation's Health, May, 1926, vol. 8, pp. 317–318.*

Rector discusses and presents figures on the cost of hospitalization of sick or injured industrial workers from different groups of industries in the New England States, in New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Wisconsin, Illinois, and Missouri, together with a small series from the South and West. In sixty-seven industries employing 274,284 workers, the cost of hospitalization varied from $2 to $7.56 per day. The plants questioned reported 3,340 cases hospitalized at an average figure of $53.48 per case. The cost of maintaining plant medical departments was given at the annual per capita figure of $5.10.—K. R. D.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

A COMPARISON OF GROUP VERBAL AND PICTORIAL TESTS OF INTELLIGENCE. *C. M. Davey. Brit. Jour. Psychol., July, 1926, vol. 17, pp. 27–48.*

It is stated that many verbal tests are invalid as measures of intelligence, as they depend chiefly on a language factor, and that nonverbal tests ought to be used instead. Again, it is stated that ability measured by verbal tests is not the same as ability measured by nonverbal tests, though Spearman maintains that all mental performances can be in part attributed to one general common function, and that this general factor "g" is what both the verbal and the nonverbal tests should measure. In the present investigation a pictorial test was devised which was closely parallel to the standardized verbal test employed. Both tests were given to 243 schoolchildren, aged 8 to 14, and the general conclusion arrived at was that the verbal test measures the same general factor "g" as the pictorial test. No evidence was obtained to show that the nonverbal test is the better measure of general intelligence because it excludes the language factor. The average correlation coefficient for the eight oral tests was 0.40, and for the six pictorial tests, 0.31. The girls did better than the boys at the oral tests, but worse at the pictorial tests. There appeared to be a development of linguistic ability as age increased from 9 to 14 years, but no development in ability to solve pictorial tests. Hence the verbal test is the more appropriate measure when investigating the higher grades of intelligence.—H. M. V.

PSYCHO-GALVANIC STUDIES ON SIXTY-FOUR MEDICAL STUDENTS. *H. C. Syz. Brit. Jour. Psychol., July, 1926, vol. 17, pp. 54–69.*

The object of the investigation was to determine in a large number of normal individuals some of the typical features presented in psychogalvanic curves and to relate them to the characteristics of the emotional behavior observed through other means. Each subject was tested for thirty to forty minutes by means of tactile and auditory stimuli, threats, and a list of

words suggestive of emotionally significant life situations. An Einthoven string galvanometer was connected to nonpolarisable electrodes applied to the palms and backs of the hands, no external current being introduced. The photographic recording method was the same as that used for electrocardiography, and a pneumographic record of the respirations was included. The average number of words reacted to was about one-third of the total list of fifty words, and the reactions were for the most part in close connection with the stimuli. The number of responses varied from 6 per cent. to 71 per cent. in different subjects, and a comparison of the frequency with the subjects' description of their own emotional make-up gave a definite correspondence. The individuals with the smallest number of responses were of a well-balanced and not especially sensitive emotional constitution, whereas the cases with most frequent reaction were of a more excitable and labile emotional type.—H. M. V.

SALVAGING THE WORKER—THROUGH WORK. *H. W. Stevens. Indust. Psychol., April, 1926, vol. 1, pp. 280–282.*

This is the story of a young girl "whose future as a worker chanced to become a problem for the diverse judgments of several psychiatrists." At the age of 16 years she became cash girl for a large department store. After about five years of this employment she had an attack of influenza that necessitated an absence of about two months. Returning to work "she became obsessed with fears arising from her sense of weakness." Her self-confidence was lost and a week later she left her position to seek relief at the outpatient department of a general hospital. Her case was diagnosed as psychotic, but failing to improve she was later sent to a hospital specializing in nervous disorders. After eight months it was decided that she had sufficiently improved to return to her home. Again she returned to the general hospital; and after several weeks with no perceptible progress, she became depressed and restless. A vaguely expressed desire to return to work was opposed in a most discouraging report to the store. This report came to the attention of the president who asked if there were any last thing they could do for the girl. The matter was referred to another psychiatrist who diagnosed the case as neurasthenic, not psychotic, and recommended that she be put to work—"very special work on special hours"—and that she be regarded more as a patient than as a worker. This advice was followed, and so after an absence of more than a year, and less than two months after the hopeless hospital report, the girl was enrolled as an active worker in the store. Her improvement continued and about three months later she was allowed to work on a full time schedule.—A. W. N.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

NEW YORK LABOR LAWS ENACTED IN 1926. *N. Y. State Dept. Labor, Bur. Statistics and Information, Special Bull. No. 145, 1926, pp. 59.*

COMPENSATION AWARDS YEAR ENDED JUNE 30, 1924. COMPENSATED ACCIDENTS JULY, 1914–JUNE, 1922. *N. Y. State Dept. Labor, Bur. Statistics and Information, Special Bull. No. 142, 1926, pp. 189.*

HYDROCELE AND WORKMEN'S COMPENSATION. *K. Scheele. Abstr. as follows from Deutsch. Ztschr. f. Chir., April, 1926, vol. 195, p. 286, in Jour. Am. Med. Assn., June 26, 1926, vol. 86, p. 2005.*

Scheele studied the evidence in 133 cases of alleged traumatic origin or aggravation of hydrocele. Because of its mobility, force applied directly to the testicle must possess a certain suddenness if it is to cause injury. Although the hydrocele itself may not form until two or three months have elapsed and external signs of injury have disappeared, the immediate subjective results of the injury are severe. If these immediate results are lacking in the history, suspicion is cast on the traumatic origin. The most frequent consequence of trauma to the testicle is hematoma outside the vaginalis; this may lead to hematoma within the vaginalis, which in turn may lead through irritation from hemorrhagic remains or traumatic periorchitis to hydrocele. Hematoma within the vaginalis however is rare, except where hydrocele already exists. Hydrocele caused by indirect force, such as strains in lifting, jumping backward or slipping when carrying a heavy burden, is rare, but possible. When infection of the testicle or epididymis exists at the time of the accident, the question of traumatic origin of the hydrocele becomes more complicated, for hydrocele may develop in local infection without trauma; on the other hand, the trauma may be responsible for aggravation of the original condition, which might not otherwise have led to hydrocele. A large hydrocele is continually exposed to trauma. Injury may make the condition worse or introduce complications, but in considering the question from the compensation angle, the possibilities in the natural course of the trouble, such as hemorrhagic periorchitis and spontaneous rupture of the wall, must be remembered.—K. R. D.

WORKMAN'S COMPENSATION FOR EYE INJURIES CHANGES. *H. Best. Nation's Health, May, 1926, vol. 8, pp. 312–314.*

This article is a review of modern judicial interpretation of workmen's compensation laws with respect to the occurrence and consequences of eye injuries to workmen—injuries not only from accidents but also from other industrial hazards, such as exposure to wood alcohol or to continued and intense glare. The effect of slight visual impairment; the question whether the sight of an eye is to be regarded as lost after an injury when, with the use of glasses, its efficiency is but little reduced; the problem of the loss of his single eye by a one-eyed person; the destruction of the remainder of vision in an already imperfect eye—all these problems are discussed by the author from the point of view of the modern trend of judicial interpretation of compensation laws.—K. R. D.

REHABILITATION OF DISABLED EMPLOYEES

How Occupational Therapists Can Help the Disabled Worker. *G. R. Stein. Occup. Therapy, April, 1926, vol. 5, pp. 125–126.*

This paper is a plea for closer co-operation between occupational therapists and rehabilitation workers, inasmuch as they have the same objective. Since the work of the therapist precedes that of the rehabilitation worker, suggestions are made that should tend to co-ordinate this work. The slow movement of hospital routine is often destructive to the morale of the patient, the result being a condition of chronic malingering and dependence on others. The patient's mind should be kept occupied, preferably with active thinking about the lines of work he hopes to enter when released, especially toward the carrying out of some work plan of his own, however imperfect this may be. The ambition may be aroused by suggestion, or by calling attention to the example of others. Make him think for himself. Wherever possible, occupations for the disabled should simulate those found in industry. This plan is more therapeutic because it impresses the patient as being practical.—A. W. N.

Report by the Employment Sub-Committee of the Joint Tuberculosis Council of the Society of Medical Officers of Health (Great Britain).

This report which has at present been only privately circulated is shortly to be published. It reviews practical experience in rehabilitating ex-sanatorium patients in employment at training colonies and factory settlements. Certain points emerge: (1) The expectation of life of those employed in this way under close medical supervision is, *ceteris paribus*, two or three times that of those who return to their ordinary places in the community; (2) the cases represent potential sources of infection isolated from the community; (3) under entirely favorable conditions industry carried on by ex-tuberculous workers may become financially self-supporting.

The Committee paid particular attention to the financial aspect of different schemes. Much depends on the outlook of the scheme, as to whether it is a stepping-stone on the way back to ordinary employment, or to provide permanent work. In the former case the succession of new workers cannot conduce to financial success, having regard to short hours—six hours is usual—and lack of skill. A better chance occurs where workers settle down permanently when their productive capacity becomes greater. Much difficulty is experienced in finding suitable occupations. Heavy outdoor work is entirely discarded; rather light repetitive work for mass production in hygienic workshops represents the ideal. Nothing is said as to how far vocational selection is practised before training is commenced. Three distinct objects should be kept in view: first, occupational therapy carried out as part of sanatorium treatment; secondly, vocational training; and thirdly, permanent settlement of ex-patients who have passed through a satisfactory period of training. Each

effort should be made cautiously and allowed to develop on normal business lines. There is no royal road to that financial success which dominates the situation; and the day is yet far distant before a reasonable absorption rate of ex-patients can be reached; even 150 adult beds turn out nine to ten patients per month continuously, while at Papworth only one settler every three weeks is being absorbed. The manager must in nearly every case be a medical man; but medical men with business knowledge, training, and capacity, all of which are needed more than in any ordinary industrial undertakings, are hard to find. The accounts for nearly every scheme show a financial loss amounting on an average every year to £15 to £20 per employed person. The question resolves itself into determining whether these persons returned to normal life would not cost the community far more, for cost of renewed sanatorium treatment on breakdowns, for upkeep of wives and families, and for new cases caused by spread of infection. Further investigation into the whole matter is needed while a close watch is kept on all the experimental schemes in existence.—E. L. C.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

A SHORT REPORT ON THE GENERAL CONDITION OF INDUSTRIAL HYGIENE IN JAPAN. *Y. Kose. Japan Med. World, Feb. 15, 1926, vol. 6, pp. 39–40.*

Improvement in the hygienic conditions of the factories and mines in Japan is admittedly due to the work of the factory inspectors required by the Factory Law of 1916. There are at present 343 factory inspectors of whom seven are physicians, trained in universities or higher medical colleges, whose duties are to see that the laws governing equipment of factories and working conditions and those providing compensation for accidents and occupational diseases are enforced; their work is also directed toward prevention of industrial diseases and propagation of necessary hygienic knowledge among employers and workers.

Textile industries claim 52 per cent. of the factories of Japan, and 81 per cent. of the workers in the textile industries are women, less than 10 per cent. of whom are married. Boarding houses are provided to accommo-

date the female workers, who are chiefly from the agricultural districts, and some factories also provide houses for workmen with families.

Large factories and most mines have their own hospitals with doctors who work in co-operation with the state factory inspectors.

Diseases of digestive organs predominate among industrial workers, followed by respiratory diseases. The present laws governing compensation state that "the employer shall compensate in case of a worker being taken ill due to his work," and their application is "rather elastic." Diseases due to industrial poisoning have mostly remained unaccounted for. Investigations with regard to prevalence of anthrax have failed to show any cases among workers in wool, hair, horns, and hoofs, but among workers in a bone powder manure factory dealing with animal bones from other countries every year two or three cases are found; the disinfection of the bones is now, therefore, being investigated. Hookworm disease is prevalent among workers in the coal pits in western Japan, and enforcement of preventive measures is needed.—B. A.

Several Results of the Investigation of Working Conditions of Workmen Engaged in Autogenous Welding. *W. Deutschmeister. Gigiena Truda, 1926, no. 1, pp. 75–79.*

The author gives an exhaustive description of the duties of the workmen employed in autogenous welding and metal cutting. The chief injuries and dangerous elements in the work consist of the following:

1. Compulsory, strained, half-stooping body posture, with the soldering iron in the half-bent right hand (in the soldering of individual parts), lying on the side, on the back, in a sitting or kneeling position (working in stationary boilers, on locomotive furnaces).

2. High temperature (as high as 30°C.) when soldering in boilers and the nearness of the face to the soldering trough (0.35 to 0.54 meters).

3. Dazzling light of the oxyacetylene flame, its high content of ultraviolet rays which can cause a disturbance of the physiologic functions of the eye, and straining of the eyes from watching over the soldering trough.

4. In acetylene generating, the liberation in the workrooms of sulphur, phosphorus, hydrogen sulphide, phosphine, carbon monoxide, and other gases.

5. In the boiler department, injurious effects on the hearing produced by pneumatic riveting.

6. Danger of explosions and conflagrations on account of the enormous spark formation.—A. W. N.

Hygiene of the Jewelry Industry. *Holtzmann. Zentralbl. f. Gewerbehyg., April, 1926, N. S. vol. 3, pp. 97–100.*

There is no ailment that is peculiar to the jewelry industry, although certain injuries and poisonings arise from the nature of the work.

The separating department distributes the metal alloys and receives the scraps, even to the sweepings and the filterings. The value of the refuse makes cleanliness in the establishment worth while. This refuse is burned to obtain the metal, which is then ground. In this process much dust is occasioned, and it is

sometimes necessary for the men to wear respirators. The smelting in crucibles on coke stoves introduces the danger of heat eczema. Application of zinc ointment moderates the effect of the heat radiation. The use of electric smelters reduces this annoyance. Separation by means of chemicals and of electrolysis necessitates the use of quantities of nitric acid, and should be performed under a serviceable hood.

The die machines are still largely operated by foot power. The workman is under heavy strain. The weight of the body rests the greater part of the time upon the left foot, while the right operates the machine. The right thigh muscles are often perceptibly stronger than the left, and the sole of the foot is thickened. These machines are always placed on the lowest floor in the factory, consequently the ventilation and the lighting are the poorest. Only especially strong persons can be employed for this work, which should be avoided by one inclined to inguinal rupture. Operation of the foot press for heavy metal strips is too severe for women. The increased flow of blood to the lower extremities causes also a congestion of blood in the abdominal organs with a tendency to hemorrhage.

The position of the left hand, necessitated by work at the bench, often brings about occupational neuritis.

In soldering by the use of the mouth blowpipe, changeable mouthpieces are advised to avoid possible infection. A blowpipe operated by air pressure and regulated by the thumb is preferable.

The use of sulphuric acid for cleansing soldered metals, and the constant burning of gas and furnaces make good ventilation absolutely necessary. Fumes from hydrochloric acid, nitric acid, potassium cyanide, and hydrocyanic acid are also to be guarded against. These fumes should be drawn off *away* from the workman.

The use of lime paste and of caustic potash solution offers another source of danger to the eye or to the skin. There is also danger of narcotic effects from the use of benzine, benzol, carbon tetrachloride, and ethylene trichloride. Workers with these substances often complain of headache, numbness, and irritation of the conjunctiva. Similar effects are produced by a solution of celluloid in acetone, used as a lacquer. The use of electrolysis is recommended from the standpoint of hygiene.

Effects from cyanides are a peculiar sweetish taste in the mouth, irritation of the conjunctiva, rush of blood to the head, and headache. Eczema of the skin occurs in people predisposed thereto.

It is the deplorable custom to send certain kinds of work to the home, where the danger is even greater than it would be in a well-regulated factory.

Lead poisoning is also to be feared from the fumes and dust arising from the use of lead sulphide.

In the polishing process much dust is created which should be drawn off. Burnishing of large articles with the hand requires considerable strength and sometimes causes pain and inflammation in the muscles and swelling of the joints.

In the cleansing of certain articles, a foaming solution is applied with a brush. This solution has an irritating effect upon the skin tissue, and

causes eczema. It is recommended that a paraffin ointment should be applied to the hands before operating.

Emphasis is laid on good illumination and ventilation. Compared with other industries the danger of accident is slight.—A. W. N.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Blood Examination of Roentgenologists. *G. Weindrach. Gigiena Truda, 1926, no. 1, pp. 47–52.*

The director of the central laboratory of the Department of Industrial Medicine conducted a thorough examination of the blood of twenty-one persons working in roentgen cabinets (physicians and others), by which he came to the conclusions: (1) that in case changes occur, eosinophilia is a common phenomenon; (2) that a certain decrease in the number of erythrocytes and a corresponding decrease in the hemoglobin were observed; and (3) that this eosinophilia is perhaps to be connected with the changes in the physiologically active mass of the spleen.—A. W. N.

Alterations in the Teeth Resulting from the Occupation. *M. Kraus. Zentralbl. f. Gewerbehyg., May, 1926, N. S. vol. 3, pp. 127–130.*

Confectioners present a characteristic form of tooth decay. It differs from the usual form by its localization, extension, soft condition, and by the brown or black color of the exposed tooth substance. It is caused by the sugar dust, which is inhaled and settles at the necks of the teeth. The acid resulting from fermentation decalcifies the teeth, permitting lodgment for the bacteria which completely destroy the tooth substance.

The characteristic discoloration of the teeth of metal workers is occasioned by the inhalation of metal dust, which settles on the teeth, becomes oxidized by the fluids of the mouth and spreads its discoloration from the gingival margin to the middle of the tooth surface. The color varies, being green, brown, or gray, according to the metal.

The dust inhaled by brickmakers causes the crowns of the teeth to be ground away.

Workers in chemical industries are subject to necrosis of the front teeth from the acid vapors in the air. The first symptoms are usually discomfort in the centrals which become sensitive to changes of temperature, and react painfully to sour, sweet, or salty foods.

The incisors, upper and lower, are frequently worn away on the cutting edge, sometimes in tiny grooves, by persons employing them excessively: cigar makers, who bite off the end of the cigar wrapper; clarinetists; teachers and clerks, from the habit of holding a pencil between the teeth; needleworkers, from biting the thread; cobblers and upholsterers, from nails held in the mouth and passed to the teeth; glass blowers, from holding and turning the blowpipe. It is remarkable that these worn edges of the teeth are always free from caries.

These occupational defects can be useful for purposes of identification.

The article is accompanied by a series of plates illustrating the various manifestations.—A. W. N.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE ACTION OF AMMONIA UPON THE LUNGS. *A. A. Horvath. Japan Med. World, Feb., 1926, vol. 6, pp. 17–29; March, 1926, pp. 49–59.*

This paper, the result of ten years' study, was undertaken in the interest of workers employed in refrigerating plants, in the manufacture of illuminating gas, in the rectification of raw petroleum, in the production of beet sugar, and in the dye and chemical industries. The author believes that the effect of inhaled ammonia on farm workers and on those domestic animals which live most of the time in stables may also be of importance.

He reviews the work of Lehmann, Ronzani, and Seifert, but questions the validity of their results on the following grounds:

(a) They did not accurately determine the concentration of ammonia in the inspired air, nor keep the concentration constant during the experiment; (b) all experiments were made with a daily interval of 16 hours as a minimum, and sometimes longer periods of many days, which would give the animal time to recover from the action of the ammonia; (c) the temperature of the animals was not taken; and lastly, (d) insufficient attention was given to microscopical studies of the lung lesions.

The improved apparatus which Horvath devised for his own experiments consisted in an electric fan which blew a current of air through a large funnel pipe over the surface of the ammonia solution. Excess of water in the air and ammonia mixture was removed by passage through boxes containing calcium oxide before the mixture entered the chamber (360 liters' capacity) in which the experimental animals—rabbits and guinea-pigs—were placed. Finally the ammonia contained in the efferent air from the chamber was passed through a box containhuric pumice stone moistened with sulping acid.

By means of this apparatus it was possible to expose series of animals to constant, known concentrations of gas for long periods of time:

Series	*Concentration of Ammonia* °/₀₀[1]	*Length of Exposure* das.
I	1.47–1.52	4–10
II	0.48–0.53	6–53
III	0.22–0.26	4–31
IV	0.12–0.17	30

[1] 1°/₀₀ = 0.1°/₀.

The results of the experiments are summarized as follows:

Rabbits and guinea pigs exposed to concentrations of 1.5°/₀₀, 0.5°/₀₀, and 0.25°/₀₀ of ammonia gas (by volume) developed subacute, acute and catarrhal-purulent tracheitis; acute, chronic, haemorrhagic, catarrhal and purulent broncho-pneumonia; indurative chronic peri-broncho-pneumonia; abscess of the lung; haemorrhagic infarct and necrosis of the lung; subpleural haemorrhages, and fibrino-purulent pleuritis and pericarditis.

Rabbits were found to be less sensitive to the presence of ammonia in the inspired air than were guinea pigs.

Exposure to lower percentage concentrations of ammonia in the inspired air resulted more often in pleuro-pneumonia, and higher percentage concentrations in catarrhal broncho-pneumonia.

Guinea pigs were found to tolerate 0.15°/₀₀ of ammonia for a month without visible external disturbances, loss of weight, or appetite, or visible macroscopical changes in the lungs at autopsy.

These findings would indicate that the concentration of ammonia for domestic animals should be lower than 0.25°/₀₀.

Habit formation (Gewöhnung) for ammonia gas, described by Lehmann and Seifert, was not observed. Therefore Lehmann's conclusion that ammonia concentrations are harmless up to 0.5°/₀₀ in factory air for "habitual" workmen is open to question.

Results of studies on the behavior of ammonia in the body have led to the following conclusions:

(a) The permeability of normal alveolar epithelium for ammonia is not yet proved.

(b) The oxidations in the body may be regulated by ammonia.

(c) The hypothesis is advanced that the pathological picture in the lungs of anaphylactic shock may be produced by ammonia liberated in the organism under the influence of a sensitizing agent.

—M. G. P.

Arsenic in Large Chemical Works. *A. Hopmann. Zentralbl. f. Gewerbehyg., May, 1926, N. S. vol. 3, pp. 126–127.*

Arsenic can cause acute as well as chronic industrial poisonings.

In the roasting of pyrites, traces of arsenic can escape into the air. From the hygienic standpoint it becomes important only when conditions favor the formation of arseniuretted hydrogen. When metals are reduced in weak acids, and arsenic is present, arseniuretted hydrogen is formed. To prevent injury, the apparatus must be kept tight and the gas conducted to a safe distance. Wherever possible, materials that are free from arsenic should be employed.

There is also danger from the slime in kettles and containers, inasmuch as these utensils must be cleaned. To do this the workman must climb inside, and should he use zinc water pails, for instance, arseniuretted hydrogen poisoning may ensue. It may be necessary, in unavoidable cases, to use gas masks or oxygen inhaling apparatus.

Dr. Hopmann presents the record of seven cases of acute arseniuretted hydrogen poisoning at the dye works of Leverkusen during the past twenty-five years. The apparatus has been improved and it is expected that no further cases will occur. No chronic arsenic poisoning has been reported.—A. W. N.

A Case of Mass Poisoning in the Rubber Factory of "Krassny Bogatyr." *N. Frolow. Gigiena Truda, 1926, no. 1, pp. 79–82.*

On Sept. 28, 1924, there occurred in the above-named rubber factory a mass poisoning from benzine of about ninety female operatives on rubber boots. On September 29 a repetition occurred in the poisoning of forty-three persons. The first poisoning, as could be positively established, was caused by the fact that the electric ventilators in the workrooms had ceased to function for some unknown reason. The second poisoning, that of September 29, can hardly be considered as poisoning, but rather, almost exclusively, as mass psychosis,

for on that day the ventilation was entirely satisfactory and an accumulation of benzine could not be established.—A. W. N.

MOTALIN. *Zentralbl. f. Gewerbehyg., July, 1926, N. S. vol. 3, pp. 203–204.*

Efforts are being made to relieve the pounding of the automobile motor by the admixture of some other substance with the benzine.

In Germany relief has been afforded by the admixture of a very small quantity of iron carbonyl, a crystalline substance not employed commercially in its pure form. It is combustible at a comparatively low temperature and is shipped in a 50 per cent. dilution with benzine, called motyl. For ordinary use it is distributed in the form of motalin, a further dilution of motyl with benzine, containing only 0.2 to 0.25 per cent. of iron carbonyl. The physical and chemical properties of the benzine are scarcely altered, and motalin may be employed with no greater precautions than are necessary in handling benzine.

There is little danger from exhaust gases, owing to the more perfect combustion as evidenced by the decreased pounding in the motor. Experiments have shown less carbon monoxide and no other injurious products.—A. W. N.

HEALTH HAZARDS OF BRASS FOUNDRIES: I. FIELD INVESTIGATIONS OF THE HEALTH HAZARDS OF THE BRASS-FOUNDRY INDUSTRY. II. LABORATORY STUDIES RELATING TO THE PATHOLOGY OF BRASS FOUNDRYMEN'S AGUE. *J. A. Turner and L. R. Thompson. U. S. Pub. Health Bull. No. 157, Aug., 1925, pp. 75.*

STREET RISK OF CARBON MONOXIDE POISONING. *E. D. Wilson, I. Gates, H. R. Owen, and W. T. Dawson. Jour. Am. Med. Assn., July 31, 1926, vol. 87, pp. 319–320.*

Examination of the blood of foot traffic policemen as they reported from eight hours of duty in crowded sections of Philadelphia showed percentage saturations of the hemoglobin with carbon monoxide as high as 30 per cent. The existence of a definite street risk of repeated or chronic slight carbon monoxide anoxemia is thus confirmed.—K. R. D.

ELIMINATION OF CARBON MONOXIDE FROM BLOOD. *W. C. Stadie. Atlantic Med. Jour., June, 1926, vol. 29, p. 616.*

PULMONARY HEMORRHAGES IN ACUTE CARBON TETRACHLORIDE POISONING. *T. Tabasaka. Abstr. as follows from Deutsch. Ztschr. f. d. ges. gerichtl. Med., vol. 11, no. 5, in München. med. Wchnschr., March 19, 1926, vol. 73, p. 503.*

Postmortem findings and experiments on animals showed that the cause of the hemorrhages is probably hemorrhagic diathesis. Rupture of the vessel walls was not observed.—M. C. S.

CASE OF FATAL POISONING BY NITROBENZENE. *D. R. Thomas. Indian Med. Gaz., May, 1926, vol. 61, p. 229.*

THEORY OF THE ACTION OF NITROUS GASES ON THE BLOOD. *W. Heubner and R. Meier. Zentralbl. f. Gewerbehyg., April, 1926, N. S. vol. 3, pp. 95–97.*

It is known that the real danger of the nitrous gases, in their action on the lungs, lies in the fact that by inhalation of these acid forming substances an edema is developed that is dangerous to life. Apart from this important fact, these gases have the power to cause alterations in the blood, namely to form methemoglobin. This makes its appearance in severe cases that quickly become fatal, and is deserving of consideration in the interest of diagnosis. The formation of methemoglobin through nitrous gases presents the same chemical reaction as does the action of nitrites on the blood:

$$NO + NO_2 + H_2O = 2\ NO_2H$$

In the presence of air the following is more correct:

$$2\ NO_2 + H_2O = NO_3H + NO_2H$$

After the inhalation of nitrous gases, salts of nitrous acid circulate through the body.

Methemoglobin has one more equivalent of oxygen than hemoglobin, the natural, acid free coloring matter of the blood.

Various possible chemical reactions are discussed, and the conclusion arrived at that the reaction between nitrites and blood pigment in the living body consists of something more than a simple oxidation, by the exclusion of oxygen and the excess of nitrite. It is pointed out that the decomposing properties of nitrous acid are not shared by its salts.

Experiments elicited further information with the following formula as the result:

$$4\ NO_2H + 4\ Hb{\cdot}O_2 + 2H_2O = 4\ NO_3H - 4\ Hb{\cdot}OH + O_2$$

This is regarded as the true reaction between nitrous acid and the blood pigment, and is, from the toxicologic point of view, alone of importance.

The fact may be of much practical significance that, in certain cases of death after the absorption of nitrites or nitrous gases, a coloring matter has been found in the blood, deceivingly like carboxyhemoglobin in appearance and chemical behavior. This may be explained by posthumous processes. It is well worth while to be attentive to this source of error, in postmortem examinations where carbon monoxide is detected in the blood.—A. W. N.

CONCERNING THE QUANTITATIVE DETERMINATION OF ANILINE ACCORDING TO THE DIAZOTIZING PROCESS. *A. Pamfilow and G. Philippytschew. Gigiena Truda, 1926, no. 1, pp. 45–47.*

The process of the titrometric determination of aniline by diazotizing is wholly unsuited to the purposes of labor protection. The causes lie in the fact that, for aniline concentrations of 0.001 normal, the diazotizing requires sixteen hours before it is complete. The samples presented by the factories are usually much diluted, and consequently exact and quick results are not to be obtained by this analysis. It is better to use the bromate or the bromine method according to Lehmann.—A. W. N.

RUBBER LATEX AS A NON-POISONOUS SUBSTITUTE FOR BENZOL CEMENTS. *N. Y. State Dept. Labor, Indust. Hyg. Bull., March, 1926, vol. 2, p. 36.*

This presents the preliminary results of an investigation undertaken to determine whether rubber latex could be substituted for benzol cements

in sealing the ends of tin cans. "Two principles seem to be fairly well established. First, it is not possible to use a jet as with the benzol cement because the mechanical agitation set up when the latex is made to flow through the small opening causes the particles of rubber to coagulate, to adhere to the metal walls of the tube, and finally to close the opening of the jet. Secondly, it has been found necessary to add other substances to the latex to bring about the stability and strength required for a permanent seal."

Latex cement does not dry so rapidly as the benzol cement but a continuous drier has been constructed which receives the wet can tops and delivers them dry, ready for packing. It is expected that further experience will eliminate the smaller difficulties and that latex units will gradually be substituted for the benzol units.—M. C. S.

SAFE HANDLING OF CHLORINE. *Safe Practices Pamphlet No. 71, Nat. Safety News, March, 1926, vol. 13, pp. 39–43.*

PROTECTION OF WORKERS IN CHROMATING PLANTS. *Förster. Zentralbl. f. Gewerbehyg., May, 1926, N. S. vol. 3, pp. 124–125.*

The unusually advantageous properties of chromium—extreme hardness, heat stability, complete resistance to chemical influence—have caused it to be employed in very many industries. In the metal industry, it is used in the manufacture of dental and surgical instruments, cutlery, and automobiles. The extended use of chromium demands consideration for the protection of the workmen.

Above the galvanic baths in which the chromating takes place, a brown mist may be seen hanging over the surface of the water. This mist is composed of fine particles of chromium which are thrown off by the galvanic process and are poisonous. It is self-evident that an exhaust appliance is indispensable, and that it should be placed directly over the water in the bath, and kept constantly in operation.

Chromium causes inflammation of the mucous membrane of the nose, which soon develops into an ulcer and may lead to perforation of the nasal septum. Ulcers appear also on the lips, arms, hands, and feet.

Workers should be instructed regarding the dangers, and should be held to strictest cleanliness. It is also important that they have suitable working clothing, as well as dressing, wash, and lunch rooms.

The galvanic baths should be operated by some adult and well-informed person. Medical examinations should be made of each worker when first employed, and each month thereafter. Special attention should be given to the skin and to the nasal septum.—A. W. N.

MONONITROPHENOL AND DINITROPHENOL AS INDUSTRIAL POISONS: THEIR MODE OF ENTRANCE INTO THE ORGANISM AND THE PARADOXICAL RIGOR MORTIS IN DEFICIENT ACID FORMATION. *K. B. Lehmann and L. Schmidt-Kehl. Arch. f. Hyg., 1926, vol. 96, pp. 363–388.*

The authors first review the information already possessed in regard to these substances, including experiments with animals, and then describe a fatal case of poisoning in a man who

was engaged in work with dinitrophenol. He had to place the damp product in the drying oven, and later to remove it and pack it. He had been instructed to wear a respirator. On the morning of the tenth day after beginning this work he complained of headache and at 2 o'clock in the afternoon he felt weak and faint. Although a warm bath seemed to help him, he went to bed because of dyspnea and distinct acceleration of respiration. About 5 o'clock the factory physician reported that the patient was tossing about restlessly and calling for air; there was also copious perspiration, pain in the vicinity of the liver, full weak pulse (140), temperature 38.8°, some râles, dilatation and rigidity of the pupils. About 7 o'clock the pulse became weak and very frequent. Venesection was done, about 8 o'clock cramps occurred, arm, leg, and face muscles contracted and with three gasping breaths the patient died. An autopsy was performed, the results of which are given in detail. Possible modes of entrance of the poison into the organism are discussed.

Then follow minute descriptions of experiments on animals, from which the authors draw the following conclusions:

The toxicity of mononitrophenol is insignificant; the toxicity of dinitrophenol, although considerably greater, is still moderate. Industrially, poisoning through the respiratory tract is of no importance, as effective quantities could enter only in very unprotected work. Whether the digestive tract is significant as a portal of entry is still a question. That there is a skin hazard associated with careless factory management is certain. The fact that only sporadic cases occur seems to intimate that several circumstances must combine—method of work, condition of the skin (secretion of sweat and sebum), clothing, alcohol intake, etc. The matter of constitutional predisposition is still in question. Individual animals reacted for the most part in a similar manner.

As prophylactic measures the authors suggest control of factory dust, cleanliness of the skin, and frequent change of work clothing.—M. C. S.

INVESTIGATIONS CONCERNING DIASTATIC FERMENTS IN THE LIVER, ESPECIALLY IN CASES OF PHOSPHORUS POISONING. *M. Staemmler. München. med. Wchnschr., April 9, 1926, vol. 73, p. 627.*

The investigations are aimed at the question: Is the vanishing of glycogen in the fatty degeneration of the liver, due to phosphorus poisoning, conditioned by a ferment disturbance? Results: In the test tube, phosphorus, even when much diluted, checks the diastatic ferments of the liver. In animal experimentation, a similar checking is demonstrable only to a very slight degree. The disappearance of glycogen from the liver in cases of phosphorus poisoning is not to be explained by an increase in the diastatic ferments and the resulting increased decomposition of glycogen. It is more likely that a ferment injury is responsible for deficient glycogen synthesis.—A. W. N.

CUTANEOUS INJURIES FROM POTASSIUM CYANIDE. *Raestrup. Zentralbl. f. Gewerbehyg., April, 1926, N. S. vol. 3, pp. 103–106.*

The more extended use of potas-

sium cyanide in industry in recent years is accompanied by an increasing number of fatalities from this poison. Two peculiar cases are here cited.

In the first case, the workman, B., was occupied with a pan of melted potassium cyanide, when some of it spilled over into a puddle of water. The hot fluid splashed in all directions, some of it into B.'s face. He became unconscious and three hours later died in the hospital.

In the second case, a workman, T., was seen staggering across the factory. It was thought that he was drunk, but he was afterward found unconscious and died five hours later.

An autopsy was performed in both cases and the results are minutely described, together with those of the chemical analyses and microscopic examinations of the skin and the internal organs.

Among other conditions it was found that in the case of B. considerable hydrocyanic acid was present in the blood and in the urine but scarcely any in the stomach. In the case of T. a considerable quantity was found in the stomach, a slight quantity in the urine, and very little in the blood.

The assumption is that B.'s is an authentic case of poisoning through the skin, while T. probably had taken the poison internally. It is supposed that he had tied bandages on his wrists with the aid of his teeth, whereby the poison in minute quantity had come into his mouth. It is to be considered that workers, accustomed to the daily handling of these poisons in large quantities, become careless.

Other conclusions are that the poison can be absorbed through the skin, only when the epidermis has been injured, as through a wound, or, as in the case of B., having been first injured through the scalding from the hot alkali.

T.'s case seems to be an unusual connection between occupational disease and accident.—A. W. N.

EXAMINATION OF PAINTERS IN THE CAR SHOPS OF THE SOUTH EASTERN RAILWAYS. *A. W. Sossimowitsch. Gigiena Truda, 1926, no. 1, pp. 63–72.*

The painters work in the paint preparing department, in the passenger and freight car department, on the painting of signs and inscriptions, in the car sheds (painting the wheel settings), and sometimes in the open air during the warm season. The examination of the workrooms yielded a long list of sanitary defects: The colors are poured out, weighed, and ground in a dry state, and there is no contrivance for drawing off the poisonous dust; the workrooms are badly cleaned; there is a lack of washing facilities; the men eat in the workshop, etc.

The qualitative and quantitative analysis of specimens of all working material gave the following result: The solvents and varnishes proved to be of good quality, without the admixture of any kind of substitute. The only materials that could occasion poisoning are lead salts in combinations that are comparatively easily assimilated by the organism: lead carbonate, lead oxide, lead chromate, and red lead.

Fifty-four painters were examined, thirty of whom were from 20 to 40 years of age. Forty-six persons (77.7 per cent.) have been at this trade

since before the age of 16 years. The most frequent illnesses shown were diseases of the nervous system, of the heart, and of the vascular system, intense alterations of the blood, and disturbances of the functions of the alimentary tract.

The author concludes that the health of most of the workmen had suffered from the influence of lead, and he recommends a number of measures to remove the effects of the lead on the organism of the workmen.—A. W. N.

NEW EXPERIMENTAL INVESTIGATIONS ON THE VALUE OF BASOPHIL GRANULATED ERYTHROCYTES IN THE EARLY DIAGNOSIS OF LEAD POISONING. *H. Lehmann. Arch. f. Hyg., 1926, vol. 96, pp. 321–351.*

The author describes in detail a number of experiments carried out on guinea-pigs, by which he was able to show that the appearance of basophil granulated erythrocytes is not a specific lead effect. By means of injection, feeding, and inhalation experiments with alcohol, glycerin, coal dust, calcium carbonate, and cement dust, basophil granulated erythrocytes were produced. These materials were chosen because the lead worker is often exposed to them either consciously or unconsciously. Since guinea-pigs are supposed to show in these experiments much the same results as would be shown by men, the author feels that his experiments offer proof that the presence of punctate erythrocytes in the blood is not sufficient evidence on which to base a positive diagnosis of lead injury or lead poisoning.—M. C. S.

AN OCCUPATIONAL DISEASE AMONG ZINC WORKERS. *C. P. McCord, A. Friedlander, W. E. Brown, and D. K. Minster. Arch. Int. Med., May, 1926, vol. 37, pp. 641–659.*

The authors report having detected, in a small galvanizing plant, widespread gastro-intestinal conditions, varying from gastro-enteritis in the younger workers to well-established gastric and duodenal ulcers among workers employed for a long time. Stress is laid on the occurrence of multiple hazards in the galvanizing industry. On this account, the authors, although they attach significance to zinc as a causative agent, feel that they are unwarranted in drawing any precise conclusions as to the etiologic factor in the cases observed.—K. R. D.

DUST HAZARDS AND THEIR EFFECTS

QUANTITATIVE DETERMINATION (DETERMINATION OF WEIGHT) OF THE DUST INHALED BY HUMAN BEINGS. *A. Burstein. Gigiena Truda, 1926, no. 1, pp. 27–45.*

The procedure generally followed in practice for the quantitative determination of the dust content of the air furnishes no exact information concerning the amount of dust inhaled by the workers.

Proceeding with the assumption that the work of a respiratory apparatus can fully imitate the activity of the human breathing apparatus, the author recommends a device constructed by himself, by which it is possible to measure directly the

quantity of dust inhaled by the test patient. For the same purpose, the author recommends also a suction pump; this is combined with a filter, which is of the requisite size and possesses an opening directed downward. These devices, both of which are illustrated, were tested in industry by the author and produced satisfactory results. He considers that it would be useful to introduce the term "dust coefficient" into industrial hygiene, which is to be understood as the average amount of dust that is inhaled in the course of the day by the workers in a specified trade.—A. W. N.

COMBATING DUST IN THE PACKING DEPARTMENT OF MACHORKA FACTORIES. *A. Golubzow. Gigiena Truda, 1926, no. 1, pp. 99–101.*

A description is given of the appliance for the suction of dust from the packing department of the Machorka factory in Stary Oskol, Kursk. By the operation of this contrivance, there remains after the work on the packing table an absolutely clean, uniform, although fine-grained tobacco, whereas formerly, from every quantity of tobacco packed in the course of the day, a portion had to be sold by the factory as refuse. Consequently, the rendering sanitary of the working conditions proved to be at the same time an advantageous improvement in production.—A. W. N.

ANALYSIS OF SILICEOUS DUST SAMPLES. *C. M. Salls. N. Y. State Dept. Labor, Indust. Hyg. Bull., March, 1926, vol. 2, pp. 33–34.*

"Factories in which there was believed to be a possible hazard due to exposure to dust containing silica were visited, the conditions of exposure noted, and samples of silica and siliceous materials were taken for laboratory examination.

"A representative group of these samples were analyzed to determine the percentage of total silica and the percentage of very fine dust below ten microns in diameter; the former being an index of the degree of hazard due to the chemical composition of the dust; and the latter being an index of the degree of hazard due to the physical form of the dust."

Of the thirty samples analyzed, the author believes that the following are dangerous: granite dust, sand blast dust, construction sand, powdered quartzite, flint, quartz, and glass sand. The following probably do not contain free silica: clay, pumice, slate, kieselguhr, and glass abrasives.

Free silica should be designated as "*acid insoluble, crystalline silica*" in order to distinguish it clearly from combined silica.

Experiments show that silicates do not produce fibrosis; whereas the fine crystalline dust of silica is extremely injurious.—J. W. F.

AEROSOLS IN INDUSTRY. *W. E. Gibbs. Jour. Soc. Chem. Indust., June 18, 1926, vol. 45, pp. 177T–182T; July 2, 1926, pp. 183T–188T.*

This paper deals with:

a. The properties of disperse systems in gases.

b. Their occurrence and treatment in industrial operations.

c. The causes and prevention of dust explosions.

d. The physiologic action of certain dusts, and its effect on the health of the workers.

The author's discussion follows much the same lines as his books on "Clouds and Smokes" (Blakiston's, Philadelphia, 1924) and "The Dust Hazard in Industry" (Benn, London, 1925).—P. D.

REMOVAL OF DUST FROM HANDWORK. *M. McMahon. N. Y. State Dept. Labor, Indust. Hyg. Bull., July, 1926, vol. 3, p. 2.*

This is a short note reporting the use of a vacuum cleaner to remove paint dust in stenciling glass signs. The background of several colors is put on the white glass plate by air brush, and a dry stencil is then laid on and the superfluous paint is removed. The brush which is used in doing this work has a circular opening in the middle into which is set a metal tube which fits into the vacuum cleaner hose. The dust is thus removed directly at the point of origin. This method may also be applied in rubbing down paint or varnish, in cleaning dried rouge or other polishing agents from glass or metal articles, and in many other kinds of work where a liquid remover or cleaner process cannot be used.—M. C. S.

THE SPREADING OF DUST ALTERATIONS AMONG WORKING STONE QUARRYMEN. *A. Böhme and Lucanus. Zentralbl. f. Gewerbehyg., July, 1926, N. S. vol. 3, pp. 181-185; Aug.-Sept., 1926, pp. 226-232.*

Injuries to the lungs of miners occasioned by the inhalation of dust have been more closely observed in recent years. They have been frequently mistaken for other pulmonary diseases owing to the difficulty of differentiation by the ordinary methods of examination. The more extended use of roentgen rays in these examinations has given reliable foundation for differentiation. The increase of connective tissue as a consequence of the chronic inhalation of dust is detected by the roentgen rays before the appearance of truly pathologic manifestations, and a far greater number of workers are found to be affected than are indicated by the clinical examination. It has been found that the stone quarrymen are more frequently and more severely affected than the coal miners. Comparisons are made among different kinds of mines and of the varying degrees of dust menace. Much of the injury is attributed to the presence of quartz in the dust, for chemical as well as for mechanical reasons.

Examination was made of sixty-nine men of the Ruhr district, 25 to 51 years of age, who were employed as stone quarriers for from four to twenty-seven years, and who were divided into groups according to length of service. Detailed reports are given of the results from the examination of each group.

While the figures in the report, being of active workers, are more favorable than those from the hospitals, yet they emphasize the danger from the continued inhalation of stone dust and the necessity for some adequate measures of protection.

The investigation report furnishes a general view of the clinical development of the picture of dust sickness. It confirms the well-known fact that slight indurations shown by the roentgen rays produce no symptoms of disease. As the indurations increase, respiration during labor becomes dif-

ficult. The respiratory sounds vary with the particular conditions. Owing to the part it plays in carrying off the dust, the pleura is soon drawn into participation, resulting in fibrous proliferation and inflammatory processes, and leading to serious pulmonary conditions. Sufferers from dust sickness nearly always complain of sticking pains during respiration.

It is rather remarkable that not one of the sixty-nine workmen examined showed positive signs of pulmonary tuberculosis. This speaks well for the practice of selecting only those who are fit for this kind of work, and furthermore indicates that pulmonary tuberculosis is not widespread among the stone quarriers. On the other hand, in the hospitals we find invalids, of long service in the mines, whose injured lungs have become easy prey to the tubercle bacilli—an added reason to guard against dust sickness. —A. W. N.

WOMEN IN DUSTY TRADES. *M. M. McMahan. N. Y. State Dept. Labor, Indust. Hyg. Bull., April, 1926, vol. 2, pp. 37-39.*

A study of the industries in which silica dust may be found, which is being conducted by the New York State Bureau of Industrial Hygiene, shows that women and children, as well as men, are directly and indirectly exposed to silica dust during work. In 153 factories comprising over twenty industries in which silica dust in some form is present, 7,680 men and 870 women were found employed. Four hundred women were working at essentially dusty operations, as compared with about 5,000 men. About 200 women were indirectly affected either by reason of the location of dusty processes in their working places or because they were obliged to go into or pass through departments in which dusty work was carried on.

Pottery making, the manufacture of mica insulators, sand paper, scouring powders, and abrasive soaps or cleansers, and several branches of the glass industry are among the industries in which women are employed in dusty processes. The number of women in the glass industry is larger than in any other of the dusty trades. Children are also found engaged in glass cutting and helping around the glass furnaces where batch shoveling is being done.—M. C. S.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

EDEMATOUS ANTHRAX OF THE FACE RESULTING IN MENINGITIS. *F. Krauss and N. O. Spikes. Am. Jour. Ophth., May, 1926, vol. 9, pp. 337-339.*

An obscure case of anthrax infection in a piecer of yarns is described. The patient gave a history of having had a small swelling, thought to be a sty, on the upper lid of his right eye. There was no local skin lesion and an incision of the lid revealed no bacilli. The anthrax bacillus was discovered only after spinal puncture was made.

The general features of anthrax infection are reviewed in contrast to the symptoms of the case.—M. C. S.

ANTHRAX STATISTICS OF THE LEATHER INDUSTRY'S TRADE UNION. *Rebentisch. Zentralbl. f. Gewerbehyg., June, 1926, N. S. vol. 3, pp. 162-169.*

In response to an official questionnaire, the Leather Industry's Trade Union has compiled a vast amount of valuable material concerning the occurrence and the fatality of industrial anthrax. During the twenty years 1906 to 1925, there were 648 cases of anthrax in 1,730 factories employing 37,274 workers; 98 cases proved fatal. Between 1906 and 1910 there was a rapid increase from 32 to 79 cases, the number remaining at or about the peak until 1913 when it rapidly declined to 2 cases in 1917. Since that time it has gradually increased until 1925 presented 29 cases. The fatalities follow a somewhat parallel course, the peak year being 1910 with 15 deaths.

The rapid increase from 1906 to 1910 is attributed to an increased use of foreign materials, and the decline from 1913 to 1917 is explained first by the repeated and emphatic instructions and admonitions that were issued, and second by the war, which decreased appreciably both the total amount of work and the quantity of imported materials. The increase since the war is causing much concern.

In 93.2 per cent. of the cases the pustules appeared on the head and neck and on the arms and hands—that is to say, on the uncovered parts of the body, and where the right hand can most easily reach in order to scratch. The scratched surface furnishes a favorable breeding ground for the anthrax bacilli. The seat of the pustules on the head and neck has substantially increased the death rate. Intestinal anthrax, which occurs seldom, must be regarded as almost unconditionally fatal. A curious fact is that the cases of anthrax occasioned by hides of cattle and game, while more infrequent than those due to sheep and goat hides, are almost twice as often fatal.

A quick method for bacteriologic determination in suspected cases is described.

Regarding treatment, a general understanding has not been reached. Interesting tables of comparison between several methods are presented, the serum treatment making the best showing.

Closer co-operation is urged between the factory management and the physicians.

For protection against anthrax infection it is essential to learn the source. It has been established that the spores cling to the hair and the fibers on the hide, and pass to the hands of the worker, who with unwashed hands scratches or feeds himself. Workers should be informed of the dangers, cautioned against uncleanliness, and urged to consult a physician in every suspected case. The physicians are also urged to inform themselves intimately on the subject.

Various tables of statistics are presented and suggestions are offered.—A. W. N.

TUBERCULOSIS AND INDUSTRY. *McI. Woody. Boston Med. and Surg.*

Jour., May 6, 1926, vol. 194, pp. 825–827.

This address is a plea for the introduction of periodic health examinations for employees in the hope of discovering tuberculosis in its incipient stages while prompt recovery is still possible and before there is danger of transmission of the disease to fellow workers. Prejudice against periodic examination may be overcome by tactful effort on the part of the industrial physician, and the next step—X-ray of the chest where the examination shows indications of tuberculosis—achieved also by skilful suggestion. If the X-ray is negative, the matter can rest until the next examination; if it is positive, the employee may be referred to his family physician, or to a chest specialist or a diagnostic clinic where necessary, or, in general, the procedure followed which will give the best chance for recovery. Success of the periodic examination will depend on the background of the particular plant and on the financial farsightedness of the men at the head of the plant.—B. A.

PNEUMONOKONIOSIS AND TUBERCULOSIS AMONG RUHR COAL MINERS. *A. Böhme. Abstr. as follows from Beitr. z. Klin. d. Tuberk., 1925, vol. 61, p. 364, in Am. Rev. Tuberc., Sept., 1926, vol. 14, pp. 72–73.*

An examination of hospital cases revealed that of 103 coal miners that had been in the work for ten years or more, 30 per cent. showed pneumonokoniosis roentgenologically, while of 66 stonemasons 70 per cent. revealed pneumonokoniosis, mostly of a severe type. Among stonemasons with pneumonokoniosis there was found in most cases a high-grade secondary tuberculosis. Among 95 coal miners in this occupation over ten years there were 5.3 per cent. with open tuberculosis, and 2 other cases revealed, clinically and roentgenologically, a fibrotic closed tuberculosis. In all, there were 18 per cent. which had then or previously suffered tertiary pulmonary tuberculosis. Among the stonemasons 12 per cent. were open, 8 per cent. definitely active, and 23 per cent. were or had been in the tertiary class. It is believed that the sharp stone particles produce mechanical injury, which easily leads to tuberculous reinfection. In this the type of stone dust plays a definite rôle.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

AN OUTLINE OF THE INDUSTRIAL SKIN DISEASES. *R. P. White. Welfare Work, June, 1926, pp. 103–105; July, 1926, pp. 122–128.*

The author is of opinion that welfare supervisors have greater opportunities for the detection of commencing industrial skin disease than come to the lot of any other factory officials. These two articles are therefore written with a view to providing welfare workers with a comprehensive survey of the subject of skin affections and to give such details as are necessary to enable them to draw correct conclusions. Certain helpful guiding points are put in the form of questions: Is there a history of a prior skin dis-

case, or any natural weakness of the constitution or skin? Is there any chemical or other irritant used in the man's work which is known to cause dermatitis? Is there any record of skin disease among others working at the same process? Does the patient recover when work is changed or exposure to the supposed irritant satisfactorily prevented? It is stated that, if only one of a number doing the same work is affected, inquiries must be carried further, as such a circumstance tends to indicate the predominance of the personal factor rather than one acting equally upon all the workers. If a skin disease continues, or breaks out again and again, after all risky exposure to an irritant has been removed, and after enough time has been allowed for the original eruption to heal, the first irritant cannot be held blamable. Affections of the skin are rare in trades where the work is dry, and are rampant in wet processes.

Industrial cancer and its causative agents are concisely dealt with. In this disease slackness, carelessness, want of attention and cleanliness are important details which should not be neglected; the actual poisonous agents, which cannot altogether be eliminated from industrial work, may be rendered less harmful by various devices.

In order to obtain a measure of the number and ramifications of skin afflictions, they must be pursued through each department of the several industries; for the purpose of illustrating this point a brief summary of the findings in various departments of the cotton industry, which is not prodigal of skin troubles, is given.

The second article concludes with a classification of the dermatergoses, which might very usefully be kept at hand for ready reference by those interested.—W. F. D.

SKIN DISEASES IN AN INDUSTRIAL CLINIC. *D. C. Parmenter and S. Dubreuilh. Boston Med. and Surg. Jour., April 22, 1926, vol. 194, pp. 709–712.*

A study was made of 532 skin cases coming to the Industrial Clinic of the Massachusetts General Hospital from Feb. 1, 1922, to Jan. 10, 1925. Out of 79,074 patients who applied to the Out-Patient Department of the Hospital, 4,870 were seen by or referred to the Industrial Clinic.

The article is summarized as follows:

This survey reveals that (1) during the years studied only 1 in 9 of the patients coming to the Industrial Clinic presented skin disease conditions, (2) the largest group of these, more than one-third, were diagnosed as dermatitis and eczema, (3) eighty-six persons or one-third of the cases considered had been engaged less than nine months in the occupation they reported at the time the disease occurred, (4) the summary of causative factors recognized as contributing to the diseased condition showed 147 cases to be of recognized industrial origin, except, possibly, the twenty-one epidermophytosis cases which were scattered through the different groups, (5) if employers and workers were better acquainted with the various occupations which can produce diseases of the skin, precautions might be taken which would enable wage earners to escape the discomfort and even incapacity which often results.

HYPERPIGMENTATION FROM HEAT. *M. G. Weill. Bull. Soc. franç. de dermat. et syph., June, 1926, pp. 442–443.*

The skin of the forehead, chin, arms, and chest of a man had gradually assumed a deep brown coloration. Beginning in patches the coloration gradually extended, or coalesced. For four years the man had been employed on the rolling mills of an iron works. The pigmentation had only appeared during the last six months and was confined to the parts above his trousers, which apparently protected him from the heat of the ingots.

Weill suggests that the onset of the coloration during the later months is due to hypofunction of the suprarenals, added to the excessive heat to which he was exposed.—R. P. W.

Cashew Nuts and Dangers in their Use. *Neubauer. Zentralbl. f. Gewerbehyg., July, 1926, N. S. vol. 3, pp. 189–194.*

As the result of working with cashew nuts, a workman in Magdeburg was afflicted with an itching inflammation of the skin, showing bright red spots on the hands, and several on the face which were presumably transferred from the hands. With the remainder of the material employed by the workman, the author made his examination and experiments.

The nut (Anacardium occidentale Linné) is minutely described and its effect attributed to the presence of 10 per cent. cardol, a reddish, oily liquid, of neutral reaction, and slight, aromatic odor.

The author experimented on his own person, by external application and by inoculation, and verified certain recorded facts to his own discomfort. Cardol is taken up in the blood circulation and has a toxic effect. This explains the headaches among workers with vanilla and the dermatitis sometimes encountered among laundry workers owing to the marking ink being made from cashew nuts. They are also used as substitute for almonds and other nuts. They may cause external as well as internal maladies, and should their use become more extensive, steps must be taken to guard against their ill effects. Workers should first rub the hands with vaseline, wear suitable gloves while handling the product, and wash carefully afterward.—A. W. N.

Occupational Melanoderma. *A. Kissmeyer. Ann. de dermat. et syph., April, 1926, vol. 7, p. 224.*

The Treatment of Roentgen-Ray Nails. *C. Pope. Jour. Am. Med. Assn., July 24, 1926, vol. 87, pp. 242–243.*

Pope outlines a simple oil treatment for the rough, ridged finger nails from which many roentgen ray operators suffer.—K. R. D.

Injury to the Auditory Nerves. *Leiser. Zentralbl. f. Gewerbehyg., March, 1926, N. S. vol. 3, pp. 75–76.*

Workmen in certain noisy industries, such as boiler factories, frequently complain of rushing, roaring, and ringing in the ears, and of loss of hearing. The heavy sound impressions have caused a chronic, inflammatory irritation of the inner ear, which gradually passes over into a degeneration of the terminations of the auditory nerves. After a number of years this leads to total deafness, often without cessation of these annoying sounds. Aural appliances are useless and the physician

is helpless so long as the patient continues in this work.

How is the hearing of the workman to be protected? The author suggests wearing a cap which may be drawn down over the ears. To avoid heating, the cap should be made of some light material, and to prevent the sound waves from passing through the skull as well as through the ears, it should be stuffed or lined with some dense, but light material.

The noises in the workshop may also be lessened by various means. The vibrations of boilers or steel plates may be deadened by binding them with rope or other elastic material. Noisy machines should be mounted upon some sound deadening base. Reverberations through the workshop may be diminished by stretching wire or netting across the rooms.—A. W. N.

DETACHMENT OF THE ZONULA LAMELLA IN GLASSBLOWERS WITH A NEW SLIT LAMP PICTURE. *F. Rotter. Abstr. as follows from Klin. Monatsbl. f. Augenh., Jan., 1926, p. 71, in Am. Jour. Ophth., Sept., 1926, vol. 9, p. 716.*

Two cases are reported. One showed the typical picture described by Elschnig. In the second, on oblique illumination, the anterior border of a perfectly clear band projected from the pupil wavy and folded, on the lens, but its transition to the lens could not be made out by any mode of examination.

A NEW METHOD (SUCTION) FOR THE REMOVAL OF FOREIGN BODIES ON THE CORNEA. *S. Israel. Am. Jour. Ophth., April, 1926, vol. 9, pp. 271–272.*

The instrument described consists of a small glass tube to be connected to any form of suction device, preferably the small water suction cylinder that attaches to any faucet, as it is the most inexpensive and efficient. The majority of all foreign bodies lying on the cornea can be removed in only a fraction of the time required when a foreign body spud is used, and there is no trauma or abrasion of the epithelium and no disability as a result. When a foreign body is deeply imbedded, its removal is facilitated by the suction method.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

SANITARY SHUTTLES. *N. Schewalew. Gigiena Truda, 1926, no. 1, pp. 93–95.*

The author enumerates a list of inventions whose purpose is to do away with the injuries that accompany the drawing through of the thread with the mouth in work at the loom. The most rational proved to be the devices in the form of a slit in the end of the head of the shuttle, through which the thread of the web can easily be drawn. The first inventions of this kind were very complicated and expensive, and the slit in the body of the shuttle weakened it and tore the warp thread. The most practical proved to be the shuttles of the "Nurik" and "Mawrik" systems of which illustrations are given. To prevent tearing of the

warp, the slit in these shuttles is rounded off.—A. W. N.

ROCK DUSTING HALTS CATASTROPHE AT NEW ORIENT MINE. *G. M. Briggs. Nat. Safety News, March, 1926, vol. 13, pp. 7–9.*

A gas explosion took place in a large Illinois coal mine, resulting in the death of five men. The director of the Illinois Department of Mines and Minerals said in his report to the mine superintendent: "Had it not been for the fine condition of the mine, and the fact that it was rock dusted very thoroughly, undoubtedly there would have been in your mine the greatest disaster in the history of coal mining."

The construction of the mine and the safety devices in use therein are described in some detail. "The mine is operated on the closed panel method, which is calculated to assist in confining any gas or dust explosion to the panel in which it originates. . . . . In addition, realizing to the full the deadly hazard contained in floating coal dust, the New Orient mine is thoroughly rock dusted. . . . . the method employed in spreading this rock dust is by means of a mechanical blower, pulled and operated from a slow speed locomotive." A further account is then given of the method of rock dusting and the installations employed.—M. G. P.

ACCIDENTS IN THE TEXTILE MILLS OF THE GOVERNMENT OF MOSCOW. *J. Schaposchnikow and J. E. Mednikow. Gigiena Truda, 1926, no. 1, pp. 83–93.*

The authors compare the statements concerning accidents in the years 1912 and 1924 in four large textile mills of the district of Moscow. The total number of accidents in the works investigated during 1912 amounted to 742, or 24.4 per thousand workers; during 1924, to 788, or 26.6 per thousand workers. If duration of working time in 1912 and in 1924 is considered, the number of accidents in 1924 is found to have increased 1.18 per thousand workers. The number of fatal accidents increased threefold as compared with 1912, deaths by electric current predominating, a fact which is to be attributed to the far-reaching electrification of the works in 1924 as compared with 1912. Characteristic is the decrease in the number of accidents with ensuing partial disability of long duration, which is explained by the shortening of the working time and the more extended application of protective appliances. The average number of days lost by each affected worker decreased 1.34.

Comparison of the accidents in the several departments shows that in the strictly producing departments (spinning, weaving, dyeing, bleaching, calico printing) the number of accidents has decreased as compared with prewar times; whereas in the auxiliary departments (mechanical, economic, and remounting workshops) where the workers must frequently change their working places and even the work itself, where they have to work with a variable expenditure of muscular tension and under various conditions, the number has considerably increased. Of especial importance in the increase of accidents in the remounting workshops was also the circumstance that these were unsuited to the manufac-

ture of large machine parts in considerable quantities. If these machine parts could be made in special factories, the number of accidents in the remounting workshops would undoubtedly decrease.—A. W. N.

INDUSTRIAL SURGERY

SIGNIFICANCE OF CREPITUS. *F. H. Flaherty. Indust. Doctor, May, 1926, vol. 4, pp. 79–80.*

The author emphasizes the fact that while trauma plays a part in the causation of crepitus, many other causes exist.—M. C. S.

PATHOGENESIS OF DEATH FROM BURNS. *H. M. Greenwald and H. Eliasberg. Abstr. as follows from Am. Jour. Med. Sciences, May, 1926, vol. 171, p. 682, in Jour. Am. Med. Assn., July 31, 1926, vol. 87, p. 356.*

Two clinical cases of burns are reported by Greenwald and Eliasberg with marked hypoglycemia. Experiments on ten rabbits were carried out to study the effects of superficial burns on the blood sugar content of the organs concerned with carbohydrate metabolism. In rabbits the cause of death may be divided into two stages: (*a*) initial stage, due to shock, which is accompanied by a high blood sugar content due to hyperactivity of the suprarenals; (*b*) secondary stage, due to degenerative changes, particularly in the suprarenals. The administration of epinephrine is to be restricted only to the secondary stage of suprarenal exhaustion, and is contraindicated in the primary stage.—K. R. D.

THE TREATMENT OF BURNS BY ACTINOTHERAPY. *E. B. Kessler. Arch. Physical Therapy, X-Ray, Radium, June, 1926, vol. 7, pp. 347–354.*

The author considers the treatment of burns by light therapy as ideal because it relieves pain, keeps down infection, stimulates epithelial growth, eliminates scars and contractures, normalizes the red and white blood count, accelerates elimination, normalizes body metabolism, acts as a tonic, and is gratifying to the patient. Three case reports are presented, with discussion.—B. A.

A CONTRIBUTION TO THE SUBJECT OF INJURIES IN THE LAUNDRY TRADE. *Verstraete. Proc. Fourth Internat. Congress on Industrial Accidents and Diseases, Amsterdam, 1926, pp. 354–355.*

At this Congress apparently three papers of dermatologic interest were read: one by the abstracter (see THIS JOUR., 1926, vol. 8, p. 367); one by Alexander Scott on "Paraffin Skin Diseases;" and the one here abstracted.

In the laundering and washing of clothes, Verstraete finds that the skin injuries and other accidents vary with the type of machinery in use. He especially emphasizes those which happen at the hot ironing and drying cylinders. These are highly heated with steam and covered with soft flannel. Very common are burns of the tips of the three middle fingers of the left hand which get trapped by the intake of the cylinders. These burns are very slow in healing. This writer further recounts the more serious acci-

dents, where the fingers get not only burnt, but crushed, ending either in severe scarring or amputations.—R. P. W.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Economy of Human Effort in Relation to Industrial Fatigue. *L. A. Legros. Soc. d. Ing. civils de France (British Section), June, 1926.*

Industrial fatigue from the viewpoint of the engineer is presented. Labor saving devices are steadily increasing, and occupations are becoming lighter. For instance, the responsible work of a signalman was in the early eighties as arduous as that of a puddling furnaceman. The shape of tools and tool handles is a matter of importance, while machines should be designed for being operated by human effort rather than by copying old models. An optimum height for tables and benches as well as machines exists. Conservatism of the operative and of the employer has to be met. Power driven machines should make the smallest possible demand upon attention and alertness; and the ideal machine should reduce industrial fatigue to a minimum. Comparisons are drawn between occupational activity and the exercise of sport, and diagrams are given showing the onset of fatigue as exhibited by athletic records. The principle exhibited here is that best production follows from steady continuous speed rather than from irregular spurts, while the amount of exertion put out must be proportional to the recuperative effect of intervening rests so that there should not be any accumulation of fatigue. Some of the psychology of industrial troubles is considered together with the influence of scientific management as devised by Taylor and Gilbreth. Finally the author suggests certain lines of research which can be followed by engineers for improving the lot of the worker by attention to machinery, tools, and environment.—E. L. C.

The Value of Research in Constitutional Hygiene in the Selection and Health Control of Youthful Workers. *T. Fürst. Zentralbl. f. Gewerbehyg., March, 1926, N. S. vol. 3, pp. 68–74.*

Industrial hygiene of today has felt the influence of the modern tendency to give more consideration to the endogenous factors contributing to injuries of the human constitution than was formerly the case. This is in direct line with the tendency of the increasing achievements of modern industrial science. This principle can be given most practical support by conducting careful medical examinations, not only for the purpose of dealing with diseases already present, or of excluding from certain occupations persons predisposed to infection, but also, according to the principles of constitutional hygiene, in order to undertake a better distribution of the workmen, according to fitness, in the various departments of labor. The established facts of psychotechnical research are also of value in constitu

tional hygiene. Each helps to complete the other.

One of the most important stipulations in an examination of young persons is the taking of exact bodily measurements; this of course is in addition to a thorough examination of the internal organs and the organs of sense, which should be made in the customary clinical method. By means of a system of anthropometry specially devised to suit the purpose of industrial hygiene, it is probable that certain labor types may be differentiated, as certain types are recognized as being best adapted for short distance running, others for long distance, etc. In similar manner types could be differentiated that show adaptation to the peculiar demands upon the worker in any particular branch of labor.

The figures representing the height, weight, and age of various persons have been assembled and mathematically manipulated into a table or body index. There are many of these body indexes, differently prepared, and discussed here at some length. It is pointed out that any marked departure from harmonious relationship in these measurements nearly always runs parallel with an inner disturbance. This has been verified to a surprising degree by medical examinations. Consequently if the departure from the tabular normal is pronounced, a medical examination should be made. Possible cases are described and discussed.

These tables of measurements simplify the examination, and it is planned to prepare further tables especially adapted to the needs of industrial hygiene. By comparing the results of examinations made from time to time on any individual workman, it may be determined whether his present employment is operating favorably or unfavorably on him. It also points the way to the correction of defects or of undesirable conditions. Furthermore, periodic examinations will impress the matter upon the mind of the workman, and stimulate in him the desire to reach the normal and to exert himself to assist in bringing it about.

Reproductions of photographs are given, illustrating bodily positions necessitated by various kinds of work. These positions with their effects upon the body and the means of counteraction and correction are discussed somewhat in detail.—A. W. N.

ADAPTABILITY TO WORK. *R. Bolt. Zentralbl. f. Gewerbehyg., April, 1926, N. S. vol. 3, pp. 85–90.*

After discoursing at some length on the importance of a man's adaptability to his work, of previous selection and training therefor, and of tests for his fitness, the speaker proceeds to point out the value of the application of this idea to the matter of accident prevention. From government statistics the fact is deduced that those persons who have met with one accident are more likely to meet with another, and that the likelihood of a recurrence increases with the number of such experiences.

Comparison is made between two groups of street car employees, each group consisting of fifty men. One group had been tested for fitness previous to being employed, the other group had not. The training of the two groups was the same. After

twenty-one months it was found that the number of accidents occurring in the nontested group was much larger than that in the tested group.

It is recommended that workmen in dangerous industries should be examined from time to time with reference to their ability in points pertaining to accident prevention, and that those who have been involved in several accidents should be transferred to less dangerous positions.

Many large institutions, such as the state railways, the postal service, and others, are earnestly occupied with the solution of problems bearing on these subjects. While progress will be slow, yet much of practical value has already been accomplished, and a number of points that were formerly merely personal opinion have been established with certainty.

In the near future, workers will not be eliminated but will be distributed according to their fitness for the work required. The result will be greater satisfaction to the individual and to the industry.—A. W. N.

PHYSIOLOGY OF WORK. *L. Ascher. Zentralbl. f. Gewerbehyg., May, 1926, N. S. vol. 3, pp. 123–124.*

Industrial medicine is undergoing at present a sort of transformation in the return from pathology to physiology. Influenced by the great success of the natural sciences in recent years, the study of outward injuries controlled research and thereby also practice. Gradually it became apparent that a better knowledge of the effect of these injuries on the body was demanded, and consequently also a better knowledge of the body and its functions. Note the present discussions concerning the function of the glands, instead of questions of bacteriology or pathology. In like manner, industrial medicine is turning to the study of the physiology of work. The study of the bodily condition of the workers finds its complement in the study of the body in action. The co-operation of the physician in industrial matters had formerly consisted chiefly of warnings against certain kinds of employment for certain people. He was handicapped by his lack of knowledge of the work itself and of the body in action at this work. This deficiency is being remedied by the taking of motion pictures of the naked workmen engaged in their various occupations.

From these pictures it has been observed that the skilled workman differs from the unskilled in his conservation of movement and of muscular action.

It is a mistake to require youthful apprentices to work immediately with the same heavy tools and implements as are used by the older and more experienced workmen, and to place them at tables and benches unsuited to their size.

In certain kinds of work, there is a tendency toward one-sided development which should be counteracted by indulgence in athletic sports.—A. W. N.

REGARDING THE LENGTH OF THE WORKING DAY IN AGRICULTURE. *W. Podgajetzky. Gigiena Truda, 1926, no. 1, pp. 104–113.*

The experimental station for the scientific organization of labor in Kiev conducted an experimental investigation regarding the utility of working

days of different durations. The observations were made on a group of women engaged in the customary agricultural labor of weeding and digging beets for the sugar factories. The group consisted of six women from 18 to 24 years of age, all of whom were in about the same bodily condition and of the same physical development. The women lived in a room specially assigned to them, and supplied themselves in the same kitchen. They were divided into three groups, each of two persons, one group working eight hours, the second ten hours, and the third twelve hours daily under the usual agricultural regulations. During the experimental period, apart from the chronometric observations and the calculation of the work accomplished, physiologic examinations were also made (of the pulse, the blood pressure, the lung capacity, muscular strength, and the weight).

The author could establish that:

1. From the point of view of economy of working strength the most advantageous is the eight-hour day; the ten and the twelve hour days increase the cost of production (36 to 45 per cent.).

2. From the point of view of economy of time, the twelve-hour day stands naturally in the first place.

3. The ten and the twelve hour days act on the physical condition, even of those with the greatest endurance, in an exhausting manner.—A. W. N.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

PREVENTION OF INDUSTRIAL DISEASE BY IMPROVED SPRAYING APPARATUS. *Förster. Zentralbl. f. Gewerbehyg., July, 1926, N. S. vol. 3, pp. 185-186.*

The modern practice of laying on colors and varnish with a spraying apparatus gives occasion to refer to diseases resulting to the workers, and to spread information concerning improved apparatus.

When the work was done with a brush, the washing facilities were adequate; today they are not. The greater possibility of disease arising from the use of spraying machines over the old brush method lies in the facts that the light employment attracts unskilled and youthful workers who do not know the dangers and are correspondingly careless, and that fine particles of the material used are scattered in the air to settle upon uncovered portions of the body and to enter the mouth and nose. The danger is somewhat lessened if the workman stands to one side rather than directly in front of the piece of work, and sprays at an angle in the opposite direction, so that the fine particles will be carried away from him by the exhaust ventilators. If these particles are carried out of doors they may have an undesirable effect on the neighborhood; moreover, the exhausts carry away the heated air from the workrooms, and in winter this may result in subjecting the workers to coryza, bronchial catarrh, neuralgia, and rheumatic afflictions.

The varnish gums up the ventilators and increases the possibility of disease. This has been somewhat obviated by passing a stream of water in front of the exhausts which precipitates the coloring matter, which is then reemployed. The air is also drawn through filtering appliances and returned to the workroom purified and warm.

The following recommendations are made:

An unobjectionable exhaust ventilator should be installed, working clothes and head coverings supplied, washing facilities provided with soap, brush, and towels. When poisonous materials are to be used, adequate instruction should first be given. The workers should be required to make use of these provisions.—A. W. N.

SANITARY AND HYGIENIC WORKING CONDITIONS IN THE COAL MINES OF THE DONEZ DISTRICT. *A. Mezatunjan. Gigiena Truda, 1926, no. 1, pp. 53-62.*

In the years 1924 and 1925, the sanitary and technical board of inspection undertook an examination of the working conditions in forty-five mines of the Donez district with a total of about 30,000 laborers and officials. In seven mines the investigation of the working conditions was especially thorough, including detailed examination of the temperature, of the dust content and gases, of the air motion, and of the barometric pressure.

The daily work is done at different depths—from 71 to 512 meters. Injurious factors are: insufficient lighting of the working places, the increased atmospheric pressure (which together with other injurious factors favors the appearance of pulmonary emphysema), the high temperature with a very high degree of moisture and insufficient ventilation. In the soft coal mines the dust content is greater and increases at the close of the working shift (in poorly ventilated tracts the dust content amounts to from 840 to 7,020 mg. per cubic meter of air, in well-ventilated tracts from 200 to 1,800 mg.). The air is also very full of dust in the shafts (at steeply raised layers) where the coal is poured into the cars—at the moment of pouring on the coal, 300 to 4,000 mg. to the cubic meter of air were here demonstrated. In other places in the mine the dust content is less. Pathogenic organisms were not found in the air of the mine. Of gases, carbon dioxide in supernormal quantities could be shown. Furthermore, the author emphasizes the insufficient institution of toilet facilities. Provision of working clothes for the workman, in accordance with the regulations of the Labor Commission, is entirely satisfactory. The author recommends a series of sanitary measures to improve the working conditions in the mines.—A. W. N.

FACTORY AND WORKSHOP. DANGEROUS AND UNHEALTHY INDUSTRIES. THE GRINDING OF CUTLERY AND EDGE TOOLS REGULATIONS, 1925, DATED OCTOBER 26, 1925. *Statutory Rules and Orders, 1925, No. 1089. H. M. Stationery Office, pp. 6.*

THE GRINDING OF METALS (MISCELLANEOUS INDUSTRIES) REGULATIONS, 1925, DATED SEPT. 2, 1925. *Ibid., No. 904. H. M. Stationery Office, pp. 7.*

Abstracted as follows in Bull. Hyg., June, 1926, vol. 1, pp. 491–492.

The first Regulations apply to grinding or glazing or processes incidental to grinding in, or incidental to the manufacture of cutlery, edge tools, swords, bayonets, files, saws, ploughs, and other cutting or piercing implements of iron or steel.

The second set of rules applies to all factories or parts thereof in which is carried on the grinding or glazing of metals or any process incidental to the grinding of metals or the cleaning of castings.

In both instances the Regulations require a provision of hoods or other appliances as well as a duct of adequate size, air tight and so arranged as to be capable of intercepting dust and carrying it away; also a fan or other efficient means of producing a draft sufficient to extract the dust. Where wet grinding is carried on, it is necessary to supply adequate exhaust and inlet ventilation or alternatively a supply of clean water conveyed by pipes and deposited on the surface of the grindstone. Suitable arrangements must be made for draining the waste water from the grindstone trough.

Ventilation means that the air of the room is to be renewed not less than fifteen times per hour and the current must be from the grinder toward the grindstone.

Inlets must be of such dimensions that no direct draft is to be caused from them. Extracting apparatus is to be inspected once in every six months and a register containing the particulars of such examination is to be kept. Particular attention must be paid to the construction of floors and walls where grinding upon a grindstone is carried on.

In the case of cleaning of castings, the walls, ceilings, and all other parts of the room except the floor and fixtures must be properly swept or otherwise cleaned at least once in every three calendar months. This requirement does not apply to any part of the room or fixtures exceeding 14 feet in height from the floor.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

THE "ATTENDING PHYSICIAN" AND THE NOTIFICATION OF OCCUPATIONAL DISEASES. *L. Reinheimer. München. med. Wchnschr., April 9, 1926, vol. 73, pp. 624–625.*

This is a discussion of the state ordinance requiring a report of cases of accident and occupational disease. This ordinance was issued in May, 1925, and opinions differ as to the particular application of various clauses; hence discussion.—A. W. N.

OCCUPATIONAL HYGIENE. *L. Teleky. München. med. Wchnschr., Feb. 5, 1926, vol. 73, pp. 252–254.*

This is a discussion of the new ordinance, with a caution against permitting monopoly of the educational sources and undue influence on the part of interested groups. Particular mention of the German Association for Industrial Hygiene and its conduct in this connection resulted in a number of protests which appear in the issue of

April 23, page 695. These in turn called forth another statement from Dr. Teleky in the issue of June 4, page 955. All the effusions deal with the ordinance and its applications—together with reproaches and recriminations.—A. W. N.

SKIN AFFLICTIONS AS OCCUPATIONAL DISEASES IN THE SENSE OF THE ORDINANCE REGARDING THE EXTENSION OF ACCIDENT INSURANCE TO INDUSTRIAL DISEASES. *Beintker. Abstr. from Deutsch. med. Wchnschr., 1926, no. 23, p. 968, in Zentralbl. f. Gewerbehyg., July, 1926, N. S. vol. 3, p. 207.*

The writer mentions the various kinds of skin affections that come under the ordinance of May 12, 1925, and deplores the fact that all forms of industrial eczema are not included, inasmuch as the worker is often seriously handicapped in his earning capacity. He further recommends that all cases be reported whether or not they come under the ordinance.—A. W. N.

THE EXTENSION OF THE ACCIDENT LAW TO OCCUPATIONAL DISEASES (MAY 12, 1925) AND ITS SIGNIFICANCE WITH REFERENCE TO INDUSTRIAL LEAD POISONING. *P. Schmidt. Zentralbl. f. Gewerbehyg., Aug.–Sept., 1926, N. S. vol. 3, pp. 243–246.*

The principle of the new law, that workers injured at their occupations for a long period or forever must be helped as far as possible, is joyfully approved.

Lead poisoning is still responsible for many cases, but the question arises: To what extent are the chronic conditions really the consequences of the poisoning? It is highly important that the continuity of observations be preserved from the beginning. It is also well to remember that lead poisoning occurs in the daily course of life outside the occupation—from drinking water, utensils, etc. Under the new conditions there is reason enough to be as conscientious as possible in forming the diagnosis and in connecting the poisoning with the occupation. First, there must be a complete understanding of the nature of the poisoning and how it came about. The author refers the reader to his previous article in the *Zentralblatt* for July and August, 1924 (see THIS JOUR., 1925, vol. 7, Abstr. Section, pp. 77–78) wherein he asserts that lead, like finest dust particles, reaches all organs of the body through the portal venous and the lymphatic systems, but more directly and dangerously through the lungs, because in a very short time it is distributed over the entire body through the blood current. Inhalation of fine lead dust or of fumes is in consequence particularly disastrous. The effect of the lead on the various organs is given in detail, and the fact noted that already existing pathologic conditions may be aggravated thereby. Diagnosis for lead poisoning is referred to the four cardinal symptoms: coloring, lead line, basophilic granulation, and hematoporphyrin in the urine; to these may be added colic and paralysis, and especially weakness of the extensor muscles. Weakness of the extensors may be verified by the use of ergographs (Teleky). In many cases chemical analysis is useful.

In relation to the new law, many complications are possible from a simple poisoning; a number of possibilities are given in detail.

There can be scarcely a doubt that these injuries develop gradually and with many single attacks; they should therefore be easily avoided. An early recognition of the poisoning and a change of employment are recommended. Symptoms are minutely described.

The author recommends to the physician a long period of study in the hospitals in order to free himself from the subjective declarations of the patient, and to follow objective methods.

One difficulty is the fact that all cardinal symptoms may be present without occasioning any clinical complaint whatever. "Healthy lead carriers" are more frequently found among old men than among women. The latter are more sensitive to all poisons. In children the course of the disease is often atypical.

Precautions: a careful selection of suitable workers, and afterward, periodic examinations.—A. W. N.

INSURANCE IN CASE OF INVALIDISM RESULTING FROM OCCUPATIONAL DISEASES IN U. S. S. R. *S. Kaplun. Zentralbl. f. Gewerbehyg., April, 1926, N. S. vol. 3, pp. 101–103.*

The question of compensation for workmen who have lost the ability to work through occupational disease, not through accident, is of great interest to carriers of insurance and to the representatives of industrial hygiene.

Professor Kaplun in this article expresses his opinion of the recent law, enacted February 19, bearing on this question. He discusses various points, such as distinction between accident and disease, between direct and indirect causation, between disability for a short period and one of long duration, and the amount of compensation.

A table, presented with the article, has been worked out by a government commission together with the central office of social insurance, and was later deliberated with industrial representatives. This table is regarded merely as a beginning, to be extended and improved as experience shall determine.

At a congress of sanitary physicians held in Moscow in May, the new law was thoroughly discussed and approved.—A. W. N.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

OCCUPATION AND HEALTH. PARTS IV, VI, VII, VIII. *Internat. Labour Office, 1925, 1926.*

A HEALTH STUDY OF TEN THOUSAND MALE INDUSTRIAL WORKERS. STATISTICAL ANALYSIS OF SURVEYS IN TEN INDUSTRIES. *R. H. Britten and L. R. Thompson. U. S. Pub. Health Bull. No. 162, June, 1926, pp. 170.*

This bulletin is the summation of the results of medical examinations of workers in ten different industries. The examinations were made for the purpose of determining the defects and diseases dependent on the special industrial hazards of each industry. The difficulty in establishing the desired relations obviously necessitated the consideration of numerous other

factors suspected of complicating the simple relations. These factors were in the main demographic, social, and anthropologic, and represent no small part of the value of this bulletin. The studies in height, weight, blood pressure, and pulse rate in relation to age, sex, race, type of occupation, defects, etc., clearly show the difficulties involved in the determination of norms of these factors and contrary to general belief show that probably the established norms are not so typical after all.

The general description of the industries presents the different conditions under which the examinations were made. Methods of examination varied among the industries and were somewhat determined by the industrial hazard and by the defects that were expected to arise under that hazard. The age, sex, length of service, occupational and racial distributions are next discussed. A careful analysis of blood pressure, pulse rate, vital capacity, chest measurements, height, weight, etc., follows; and, finally, the various defects and diseases are treated with the same thoroughness in the light of the foregoing factors.

The bulletin abounds with valuable data on normal individuals of a definite social racial and economic status. Although the authors point out the probable sources of error involved in the collection of the measurements, the resulting data are as good if not better than most material obtained from group physical examinations and they should be given deserving weight in the determination of certain norms. The nature of the data demands statistical analysis. They are complicated by numerous extraneous and unessential factors which obscure the importance of those in which we are interested and which add to the pitfalls of statistical analysis. The authors have made a most critical and conservative evaluation of the data and, although they suggest many interesting relations, they attach importance only to the least doubtful ones and their conclusions can be accepted with as much assurance as we are accustomed to entertain in accepting statistical conclusions in general. The results are too numerous to list here and are completely given under the general summary of the study. The bulletin presents many raw data which will be of value in further analyses in connection with similar studies.—C. R. D.

HYGIENIC CONDITIONS IN THE INCANDESCENT LAMP INDUSTRY. *L. Sommerfeld. Gigiena Truda, 1926, no. 4, pp. 28–36.*

The author investigated the manufacture of incandescent lamps in the Osram works in Berlin. He gives a detailed description of the individual processes in the manufacture, of the sources of danger, of the health hazards, and of the diseases in this industry, and outlines measures which are necessary to overcome the health hazards.—M. C. S.

WORKING CONDITIONS IN THE FERMENTATION CELLARS OF THE LENINGRAD BREWERY "KRASSNAJA BAVARIA." *E. Wigdortschik. Gigiena Truda, 1926, no. 4, pp. 58–66.*

The injurious factors of work in fermentation cellars are:

1. The low temperatures. Readings made in the cellars in September,

January, and February showed temperature fluctuations between 7.2° and 3.8°C.

2. The high degree of humidity due to the large amount of fermenting must in open vats. Observations made in the three months above mentioned gave a moisture content of 92.2 to 100 per cent.

According to the dry kata-thermometer readings, the heat loss in different parts of the cellars varied between 7 and 14 millicalories, averaging between 10 and 11. By the wet kata the heat loss reached 27 millicalories in several instances. The rate of air motion only rarely exceeds 0.2 meter a second.

3. Insufficient artificial illumination. The lighting is below standard everywhere and in many places is less than 1 lux.

4. The highest amount of carbon dioxide in the air—2.71 to 2.78 per cent.—was found in September when the ventilation was almost entirely stopped in order to avoid heating the rooms; in October the carbon dioxide content was 2 per cent. Acute carbon dioxide poisoning was not observed. In the summer months the workers complained more often of headache and tinnitus.—M. C. S.

INDUSTRIAL MEDICINE: RELATION TO STATE MEDICINE. *N. R. Wallentine. Northwest Med., June, 1926, vol. 25, p. 317.*

GENERAL REPORT. *Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926, pp. 3–62.*

A tendency for trade and production to improve during the year was noted; although shipbuilding was depressed, building was active and so were the motor and some other industries. A centrifugal movement from cramped surroundings in large towns to their outskirts, particularly for London, continues and is highly beneficial. The beet sugar industry has developed, as has also the manufacture of safety razor blades, while fashion has lessened the demand for hairpins, buttons, hooks, and eyes. Small workshops continue to decrease in number and factories to increase.

A slight diminution of accidents occurred, especially among young persons; for fatalities the construction of buildings stood at the top. The safety first movement spread and satisfactory results are instanced. Abrasive wheels continued to replace natural sandstones, with advantage from danger of bursting and from dust risk; far less dust is generated and it does not contain free silica. Information is given as to enforcement of regulations in dangerous trades, controlling exposure to lead risk in the potteries, rubber industry, manufacture of electric accumulators, and lead smelting, exposure to dust in grinding metals and in the potteries, and to fumes in the chemical industry. Material progress is reported in ventilation and special attention has been paid to lighting.

The forty-eight-hour week has become almost universal, spread in a number of places over a five-day week; two four-and-one-half-hour spells are fairly customary, with short rest pauses in each spell for refreshment; once introduced, rest pauses are seldom abandoned. Welfare schemes are said to be operating widely and to be extending in the textile trades.

One large welfare association affects forty-two spinning mills; first aid, messrooms, overalls, cloakrooms, seats in the mills, and washing accommodation are all arranged for, while recreation of all sorts and sick benefit and pension schemes are organized; a medical service with annual examination up to the age of 18 is provided. A word is said in favor of rest rooms, a pressing need where women are employed. Factory dental service is on the increase. Outwork, or work given out to be done at home, is common in many trades, particularly in tailoring, and was especially investigated. Its extent, which diminishes in times of depression, is difficult to estimate; it represents an old custom and is not invading new industries; generally few bad conditions were found, the work usually going into good, clean homes.—E. L. C.

REPORT OF THE SENIOR MEDICAL INSPECTOR. *T. Legge. Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926, pp. 63–84.*

Reference is made to medical investigations. One concerned the use of luminous paint containing radium bromide; symptoms of necrosis of the jaw and aplastic anemia comparable to those observed in America were not detected, but some lymphocytosis, polycythemia, and diminution of polymorphonuclear leukocytes were found in the few persons employed. Cases of caisson disease following too rapid decompression from a pressure of only 30 to 35 pounds were looked into; work was done for three hours under pressure with three hours off, and then a further three hours under, with thirty-five minutes for decompression which was often unduly shortened. Only young and thin men were selected for work, and the shift was altered to one of four hours in every twenty-four hours; by these means cases requiring recompression were greatly reduced. The use of hand pneumatic tools, except for inconvenience due to cold produced by the expanding compressed air, was not found to cause permanent injury to the nervous system or to the general health.

Cases of lead poisoning fell, from 486 with 32 deaths in 1924, to 326 with 13 deaths, largely owing to a fall from 131 to 31 cases in burning off lead paint in shipbreaking, but this fall was due to diminished risk rather than to hygienic control. The average age at death from lead poisoning in the potteries has been steadily increasing from 41 years in 1900 to 1904 to 51 years in 1920 to 1924, an entirely favorable result of much intensive preventive action. Paint spraying has enormously developed, but in the motor car industry only leadless paints are used; where lead paints were used on articles of cane and basket work, lead poisoning occurred. Outside factory occupations, house painting stands easily first as causing lead poisoning, greater in amount and in severity.

Cases of aniline poisoning are discussed, including two of tumors of the bladder. The campaign against anthrax continues, and attention is drawn to the fact that skilled treatment with serum has more than halved the case mortality which for the last five years was 13.6 per cent. in the wool trade and 10.3 per cent. for hides and skins, as compared with 29.6 and 23.1, respectively, in 1901 to 1905.

Epithelioma among cotton mule spinners due to contact with oil has been reported on; between 1876 and 1925 a total of 539 cases was traced, of which 450 were on the scrotum; the shortest period of employment was ten years and the longest, sixty-three; 27 cases of scrotal epithelioma occurred in 1924 giving a death rate of 0.5 per thousand, or of 1.4 per thousand for spinners aged 35 years or over. Certain cases occurred elsewhere on the skin, a fact which gives interest to the detection of oil particles in the air of mule spinning rooms; as many as 38 droplets, from 2 to 10 microns in size, were found in 1 c.c. of air taken near to recently oiled spindles. An investigation of the dust of cotton card rooms has not led to the detection of the constituent which gives rise to strippers' asthma; cotton hairs, and conidia and spores of molds, are always present, and may be causative. Molds have certainly been blamed for originating weavers' cough described by Dr. Middleton (see THIS JOUR., 1926, vol. 8, p. 428).

A table of some interest shows the occurrence of accidents from gases and fumes from year to year; the most notable point is an increase in cases of carbon monoxide poisoning from 59, with 7 deaths, in 1913, to 118 cases, with 10 deaths, in 1925. The use of coal and producer gases accounted for an increase of 30 cases, and exhaust gases from petrol engines for 5. Cases of poisoning due to benzol and naphtha fell from 25, 55, and 26 in 1922, 1923, and 1924, respectively, to only 3 in 1925. Seventeen cases of poisoning, 1 fatal, were due to accidental leaks of nickel carbonyl.

The use is reported of a saline drink for reducing fatigue and preventing cramp among stokers in retort houses, made as follows: a stock solution of 180 gm. of sodium chloride and 120 gm. of potassium chloride to 1 liter of water; for use, 2 tablespoonfuls are added to 1 gallon of drinking water.

The number of young persons examined for employment during the year was 350,802, of whom 155,954 were boys and 194,848 were girls; 2.1 per cent. of the boys were rejected and 3.7 per cent. of the girls. Medical reasons accounted for 1.84 per cent. of all rejections; 2.75 per cent. of the total were passed with conditional certificates. Of causes of rejection pediculosis stood at the top; disease of the eyes and eyelids, second; disease of the ear, nose, and throat, third; and disease of the circulatory system, fourth.—E. L. C.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

LUNG CANCER IN MINERS. *Rostoski, Saupe, and Schmorl. Abstr. as follows from Ztschr. f. Krebsforsch., May 20, 1926, vol. 23, p. 360, in Jour. Am. Med. Assn., July 24, 1926, vol. 87, p. 289.*

Rostoski, Saupe, and Schmorl deal with the lung tumors observed among the miners of ores in Schneeberg in Saxony: Twenty-one deaths occurred in three and a quarter years among 154 miners. Of these, postmortem

examination revealed cancer of the lung in thirteen cases and, among the eight who had not been subjected to necropsy, a tumor was probable in two. This makes 71 per cent. of the deaths as due to tumors—mostly carcinomas—of the lungs. Among them were two who had stopped working in the mines fifteen and twenty-two years before. Only two deaths from lung tumors were noted among the nonminer population of the district. A marked anthracochalicosis of the lungs may predispose to cancer, but does not account fully for its development.—K. R. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE MOST EFFECTIVE FIRST AID FOR USE IN CASES OF ASPHYXIATION. *R. Legendre. Rev. d'hyg., May, 1926, vol. 48, pp. 385–419.*

The author advocates the adoption of the Schäfer prone pressure method of resuscitation to the exclusion of all other methods and stresses the importance of educating the public in its use. He describes, with illustrations, the Legendre-Nicloux mask for oxygen inhalation to be used in conjunction with the maneuvers of artificial respiration.—M. C. S.

THE MANUFACTURE OF CHLOROFORM AND THE EFFECT OF CHLORIDE OF LIME ON THE ORGANISM. *A. Jakowlewa. Gigiena Truda, 1926, no. 4, pp. 46–51.*

The author reports a case of chloroform poisoning among factory workers. They suffered from expiratory dyspnea, violent cough, pain in the chest, conjunctival injection, excessive flow of tears, and blepharospasm as a result of irritation of the conjunctiva.

The symptoms were varied; some suffered chiefly or exclusively from an affection of the respiratory tract; others from affection of the conjunctiva. The cause was the insufficient protection of the workers from the effect of the chloride of lime which, mixed with water and 20 per cent. alcohol, is distilled to make chloroform. After complete mechanization of the process, at the instigation of the physician, cases of illness decreased significantly.

The importance of correct first aid and a knowledge of industrial diseases is emphasized. No zinc solutions should be put in the eye in case of irritation of the conjunctiva due to chloride of lime.—M. C. S.

A WIDESPREAD OCCUPATIONAL DISEASE. *G. R. G. Fisher. Manufacturers News, April 3, 1926, vol. 29, pp. 13–14.*

Simple measures are given through which the worker in lead may lessen the risk of absorption of lead dust and eliminate the lead salts from his system. An important point is the use of the right kind of germicide on wounds where lead is present. Gly-soiodinate (G. S. I.) is advocated, inasmuch as it "instantly and positively alters the chemical constituency of lead, first by precipitating the lead with the potassium salts present; and

then dissolving the entire mass so that it can be taken up either by the dressing, or absorbed in the system as a harmless neutral substance."—B. A.

THE DEMONSTRATION OF BLOOD PREPARATIONS IN SUSPECTED LEAD POISONING. *L. Schwarz. Zentralbl. f. Gewerbehyg., June, 1926, N. S. vol. 3, pp. 169–171.*

Schwarz finds that dark field illumination readily reveals stippling in red cells that can only be shown by direct illumination after patient search. The borax-methylene blue method is by far the most suitable staining method for this purpose. The author attaches no importance to the polychromatic erythrocytes for practical purposes.—L. T. F.

NOTE ON THE TECHNIC OF STAINING BASOPHILIC STIPPLED RED BLOOD CELLS. *L. Schwarz. Zentralbl. f. Gewerbehyg., Aug.–Sept., 1926, N. S. vol. 3, pp. 248–249.*

A boric acid-methylene blue solution is prepared by dissolving 2 gm. of boric acid and 1 gm. of methylene blue in 1,000 c.c. of boiled, distilled water. A sodium hydroxide solution containing 0.65 gm. of solid sodium hydroxide in 1,000 c.c. of boiled, distilled water is also prepared. These quantities preserved in glass-stoppered bottles will last for several months. The alkaline methylene blue solution is prepared by pouring equal parts of the two solutions into a small flask having a Kipp burette fitted through a rubber stopper. The blood film is hardened for three to five minutes in methyl alcohol, is then washed in carbon dioxide free distilled water, dried, and stained for five seconds. It is again washed, allowed to dry in the air, and examined at once. The method has been successfully used by several investigators in the Hygienic Institute (Hamburg) for some time.—L. T. F.

PHOSPHORUS NECROSIS IN THE MANUFACTURE OF FIREWORKS AND IN THE PREPARATION OF PHOSPHORUS. *E. F. Ward. U. S. Bur. Labor Statistics, Bull. No. 405, May, 1926, pp. 44.*

Preliminary to the main report, a brief history of phosphorus necrosis is given, and the chemical properties of phosphorus and the symptoms and treatment of chronic phosphorus poisoning are reviewed.

The report covers a study of three industries in which there is risk of exposure to phosphorus poisoning—phosphorus fireworks plants, phosphorus extracting plants, and the vermin exterminator industry.

In the three phosphorus fireworks plants which were visited, there were 366 employees, 181 men and 185 women. Of this number, 71 (56 women and 15 men) were engaged in the phosphorus processes. Fourteen definite cases of phosphorus necrosis, 2 of them fatal, had occurred among the employees of these three plants. Abstracts of the medical histories of these cases are given. In some instances the victims had known that they were working with poisonous material and had been warned; the majority, however, did not realize that their occupation was harmful.

In one of the two phosphorus extraction plants studied, four cases of phosphorus necrosis had occurred over a long period of years. This factory

has been shut down for the last five years. In the other plant, particular care has been given to the teeth of employees, free dental care being furnished and frequent examinations being made. In the past twenty years there has been only one case of necrosis (probably phosphorus) and this occurred nearly twenty years ago. There was also a case of diseased antrum in a man who died about a year before this study was made, but this was not diagnosed as phosphorus necrosis. The experience in these two plants demonstrates the value of preventive measures, particularly care of the teeth.

No case of phosphorus necrosis was found to have occurred in the twelve plants manufacturing rat paste. This is probably due to the intermittent character of the industry.

The phosphorus fireworks industry offers the greatest hazard. The following methods for decreasing this hazard, some of which have already been adopted, are recommended:

1. Suitable ventilation and exhaust pipes to remove the fumes before they reach the breathing level of the workers.

2. Adequate and convenient washing facilities.

3. Provision of a room removed from phosphorus processes where employees may eat.

4. Transfer of employees to non-phosphorus processes from time to time, particularly after extraction of a tooth.

5. Regular dental and medical inspection.

6. Furnishing of mouth wash.

7. Introduction of automatic machinery for shaping and wrapping lozenges.

8. Instruction of workers with regard to hazard.

Appended to this report is a history of phosphorus necrosis in the match industry in various countries, of phosphorus poisoning in Great Britain after 1915, of acute phosphorus poisoning from fireworks, and of a case of phosphorus necrosis in the exterminator industry in New Zealand.—M. C. S.

EFFECTS OF USE OF RADIOACTIVE SUBSTANCES ON THE HEALTH OF WORKERS. *U. S. Month. Labor Rev., May, 1926, vol. 22, pp. 958–971.*

This article brings together the results and conclusions of studies on the probable danger in the manufacture and use of radium and radioactive substances which have been published prior to 1926.

DUST HAZARDS AND THEIR EFFECTS

CONTRIBUTIONS TO THE ROENTGENOLOGY OF PULMONARY ANTHRACOSIS. *L. Edling. Brit. Jour. Radiol., June, 1926, vol. 31, pp. 207–218.*

A series of forty-six coal miners from Höganäs in southern Sweden were examined. In these mines "there exists only pure soft coal, somewhat alloyed by shale. Practically, the coal fields are free from every kind of stone, and consequently stone dust cannot possibly have contributed, to an extent worth mentioning, to the lung conditions . . . . "

J. I. H.
March, 1927

The author divides his cases into three groups, or stages (those described by Pancoast, Miller, and Landis in 1917), which are given in the résumé as follows:

I. *Cases without characteristical signs of anthracosis.* Most of these showed light chronic hilum and peribronchial induration, a few displayed traces of a mottled appearance of the lung fields.

II. *Cases with full-developed anthracosis,* characterised by a well-marked mottled structure throughout both lung-fields. When found only in certain part of the lungs, the mottling was, nevertheless, generally symmetrical on both sides.

The detailed appearance of this mottling varies somewhat according to the technique employed. The individual spots are mostly not bigger than a pin's head, commonly arranged as a meshwork or in rows along the bronchial ramifications. X-ray pictures from such lungs, blown up post-mortem, display a sponge-like network of minute nodules.

As main *difference against the X-ray picture of pulmonary tuberculosis* the author emphasizes that in anthracosis the apices of the lungs are relatively free, not so in tuberculosis; and that with the latter, the shadows are more uniform and more diffusely spread.

Moreover, in this group there is generally a marked hilum and peribronchial induration, often bronchiectases.

III. *Full-developed anthracosis with solid indurations.* Very marked enlargement and density of the hilum, peribronchial induration, bronchiectases and a high degree of emphysema. Especially characteristic are the large, compact, well-defined and very dense indurations of various form and size, situated sometimes in the hilum regions, sometimes in the bases or in the subapical parts of the lungs.

The mean age for Group I is 39 years; for Group II, 51 years; and for Group III, 64 years. The average time of employment in underground mining work for the men in Group I is fifteen years; for those in Group II, thirty years; and for those in Group III, forty-one years.

Coexistent tuberculosis is roentgenologically suspected in four cases of this series, only in one, though, of an active kind. In this case, the suspicion was clinically and bacteriologically confirmed, not in the others. The percentage of tuberculosis lies here considerably below the average of the population. Histologically, the coal dust occurs in the lungs as small, round, black grains, lying free in the air-passages and lymph vessels or in phagocytes, without any mixing with foreign particles of different kind. The indurated parts are characterised by atelectasis, hyperaemia, stasis and oedema of the tissues, but not by any traces of real fibrosis, nor by any inflammatory cell infiltration whatever, and no evidence of tuberculous changes.

—P. D.

THE "DUSTED LUNG" OF MINERS AND ITS RELATION TO TUBERCULOSIS. *A. Böhme. Klin. Wchnschr., 1926, no. 27.*

ANNUAL REPORT OF THE SOUTH AFRICAN INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR ENDED 31ST DECEMBER, 1925. *Johannesburg, 1926, pp. 37.*

Industrial hygiene has claimed attention during the year with regard to silicosis and tuberculosis, particularly with regard to the part played by bacterial infections of the lungs in the production of silicosis. Tuberculosis appears now to be in fact the dominating factor in miners' phthisis on the Witwatersrand; hence environmental conditions affecting tuberculosis are as important as dust inhalation. Inhaled dust seems capable of facilitating tuberculous and other infections before it produces recognizable silico-

sis. A fall in dust concentration year by year has not been associated with a corresponding fall in the incidence of silicosis; apparently when the dust concentration is too slight to produce disabling lung lesions, it may still facilitate respiratory infection. Investigation of the effects following inhalation of asbestos dust has afforded no evidence that this material is a phthisis producing dust.—E. L. C.

REPORT ON THE INCIDENCE OF SILICOSIS IN THE POTTERY INDUSTRY. *C. L. Sutherland and S. Bryson. H. M. Stationery Office, 1926, pp. 52.*

The information embodied in this report was collected in order to establish the incidence of silicosis in the pottery industry, so that a scheme of compensation may be drawn up under the Provisions of the Workmen's Compensation (Silicosis) Acts of 1918 and 1924. A sample number of workers from each pottery process, about 3 per cent. of all employed in the industry, was submitted to careful clinical examination; in all 344 males and 224 females were examined, of whom 166 males and 64 females were X-rayed. Silicosis was found in 76 men and in 11 women; on this basis there should be nearly 1,400 males and over 400 females with silicosis employed today in the industry.

One point of interest made is that, contrary to the opinion held in South Africa, the investigators consider that they were able to detect silicosis earlier by clinical examination than from radiography.

Although the numbers examined at each process are too small to give a reliable indication of the extent of the risk involved, yet when the processes are grouped together, according to intensity of risk, certain interesting facts emerge. Thus among those exposed to unmixed flint dust, 32 per cent. of the males were found with silicosis; of workers exposed to dust from composite earthenware bodies, about 25 per cent. of the men were affected; while the percentage of those affected who were exposed to more indefinite dust hazards was much lower. The proportion of women found with silicosis was less than that of men, owing of course to the shorter industrial life of females as compared with males.

The risk in the pottery industry is essentially concerned with exposure to dust of finely powdered flint, whether this material is used, mixed with other materials, as part of the earthenware body, or for embedding chinaware while it is being burnt in the kilns. There is also risk in crushing the flints in flint mills for the trade. Certain operatives examined were exposed to other dusts quite free from silica, for example, dusts of plaster of Paris in modeling and mold making, and of red marl used for Rockingham ware; silicosis was not found present in these workers.

The authors dwell on the point that symptoms of bronchitis were found more widespread in the industry than the occurrence of silicosis; and this indeed might be expected since many dusts cause bronchitis which do not give rise to silicotic fibrosis. No estimate was attempted of the amount of tuberculosis present in the industry; the workers were taken from work to be examined, and but few persons with tuberculosis would be found in sufficiently vigorous health

to be at work. Tuberculous infection implanted on silicosis usually rapidly incapacitates the sufferer. The distribution of the cases of silicosis according to period of employment indicates that the great majority of cases occur in the pottery industry after twenty years' employment. Dr. Middleton in his useful preface to the report emphasizes the prevalence of the disease found and points to improvement needed for reducing much more the dust danger in the industry. Possibly if a compensation scheme is applied to the industry, the financial incentive will lead to the adoption of vastly greater care in eliminating the risk.—E. L. C.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

WHY INDUSTRIAL HEALTH IS A TUBERCULOSIS PROBLEM. *E. R. Hayhurst. Abstr. from Tr. Nat. Tuberc. Assn., 1925, pp. 434–441, in U. S. Month. Labor Rev., April, 1926, vol. 22, pp. 880–882.*

The check in the general decline of tuberculosis has been ascribed by different authorities to the fact that workers' rates for tuberculosis are not decreasing in the same proportion as those for other classes. Dr. Hayhurst gives as the reasons for this: the indiscriminate hiring and placing of individuals without physical examination; failure to investigate remote causes of illnesses and absences; the placement of juveniles in quiet indoor jobs during their years of adolescence; widespread ignorance of the nutritive values of food; and the growth of quasiscientific health supervision as a result of the absence of medical supervision in thousands of plants.

There are, at the present time, according to Dr. Hayhurst, thirty-one states which are practically oblivious of the subject of industrial hygiene in official practice, and what is being done in the remaining seventeen states will bear very little scrutiny. Occupational diseases are presumed to be reported to labor departments in nine states and to health departments in twenty-one states, but in very few of this number is anything being done with or about occupational diseases after they are reported.

The methods of prevention of individual tuberculosis in industry are summed up as follows: (1) a constant lookout for the common environmental hazards to health; (2) a rapid extension of the physical examinations of employees; and (3) a constant inquiry into the causes of ordinary health complaints, such as headache, dyspepsia, tiredness, etc., which are really the forerunners of diseases like tuberculosis. "The question is not one of tracing industrial tuberculosis back from the dispensary to the workplace, but preferably one of tracing industrial and personal health hazards forward into health complaints and nipping both before tuberculosis develops."—M. C. S.

COURSE AND FREQUENCY OF TUBERCULOSIS IN THE DISTRICT INHABITED BY CERAMIC WORKERS. *F. Kreuser. Abstr. as follows from Beitr.*

z. Klin. d. Tuberk., May 20, 1926, vol. 63, p. 530, in München. med. Wchnschr., July 16, 1926, vol. 73, p. 1207.

Ceramic workers and their relatives show considerably more deaths from chronic bronchitis, emphysema, and tuberculosis (twice as many) than all other occupational groups. The age at death for tuberculosis lies predominantly in the sixth decade as compared with the peak in the third decade in other occupations. It is not proved that the social conditions constitute an essential cause of the increased frequency; rather is it a question of a direct occupational injury, possibly favored by the pursuit of the same trade by members of the same family for decades.—M. C. S.

TUBERCULOUS INFECTION AND TUBERCULOSIS AS MODIFIED BY EXPERIMENTAL PNEUMONOKONIOSIS. *L. U. Gardner. Abstr. as follows from Tubercle, April, 1925, vol. 6, p. 336, and June, 1925, p. 443, in Am. Rev. Tuberc., Aug., 1926, vol. 14, pp. 36–37.*

The factor of inhaled mineral dust in industry exerts a profound influence upon the incidence of pulmonary tuberculosis. It was thought that of all the so called predisposing factors to tuberculous disease, this one might be subjected to controlled experimental application. It was hoped that such a study might establish the reason for the increased incidence of pulmonary tuberculosis in certain dusty industries. Methods for "dusting" and infecting guinea pigs are briefly described. In the treatment of tissues for microscopic study one point is of great importance; that is, the lungs should always be fixed by the injection of Zenker's fluid into the trachea before they are removed from the body. This not only gives perfect preservation of the tissues, but so distends the air spaces that their anatomical structure may be clearly observed. Marble and granite dust and carborundum powder were used for the inhalation or dusting experiments, and recently quartz-dust inhalations have also been started. Carborundum is silicon carbide; marble contains about 90 per cent calcium oxide, with 1 or 2 per cent of silicon oxide; quartz is relatively pure silicon oxide, while granite is a mixture of silicate and silica, yielding on analysis about 70 per cent silicon oxide, of which 25 to 30 per cent is uncombined. The effect on guinea pigs of the prolonged inhalation of the first three dusts is briefly as follows: Granite dust is readily removed from the lungs to the regional lymph nodes, where it produces a marked fibrosis, resulting in lymph stasis, which is followed by inflammatory thickening of areolar tissues adjacent to the lymphatic trunks. Marble dust may act like granite dust through its small silica content. The large calcium content of marble dust apparently produces no changes. Carborundum dust is removed very slowly from the lungs, and produces insignificant changes in the normal tissues. In animals infected with tubercle bacilli of low virulence by inhalation, dusting with carborundum powder was found to produce a generalized chronic pulmonary tuberculosis. The pulmonary tubercles did not resolve as they do in nondusted animals. A previous prolonged dusting of the lungs with granite, carborundum and marble dusts renders them more susceptible to subsequent infection with tubercle bacilli. This increased susceptibility is greatest with granite and least with marble. The cause is attributed to lymphatic obstruction, and not to any peculiar susceptibility of dust-irritated tissues. The course of a primary inhalation infection with virulent microorganisms was found to be more chronic, as a result of the inhalation of granite and carborundum dusts, due to the tendency to fibrosis and cavitation. Subcutaneous inoculation with tubercle bacilli of low virulence in animals dusted with carborundum, granite and quartz dusts failed to produce infection of the lungs although the tracheobronchial lymph nodes are heavily involved. Evidently the obstruction of the pulmonary lymph channels induced by the dusting is not complete, and these vessels are still

capable of removing foreign bodies from the lungs. Animals infected with bacilli of low virulence and subject to dust inhalation, in response to superinfection with virulent bacilli develop a much more chronic type of disease than in the undusted control. Larger superinfecting doses without immediate death are also tolerated. The mortality from epizoötic pneumonia among guinea pigs exposed to dust inhalation was found to be excessive, probably due to the factor of lymphatic obstruction. The application of these findings to the problems of industrial pneumonokoniosis is briefly indicated. If the primary lesion of pneumonokoniosis is in the tracheobronchial lymph nodes, then the time required for the development of the disease is that which is necessary to transport sufficient dust to these nodes to produce an obstruction in their sinuses. In case the nodes are normal, many years will be needed to obstruct them; while nodes already involved with healed or healing tuberculosis would more readily react to smaller amounts of dust, and an obstructive fibrosis would occur after a much shorter time. Such an explanation could account for the great irregularity in the time required for the development of demonstrable silicosis in industry. Exposure to certain silicious dusts can cause a new dissemination of tubercle bacilli from old partially healed foci. The adult white laborer more likely receives his superinfection from within rather than from his external surroundings.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Skin Diseases. *Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926.*

Dermatologic questions consumed quite a large proportion of the time and activities of the medical factory inspectorate during the year 1925.

According to the report of Sir Thomas Legge to the Chief Inspector of Factories, the investigation into mule spinners' cancer is being continued. The cases of bakers' eczema have increased to twenty and the disease is receiving the renewed attention of these medical experts. On the difficulties of distinguishing between certain cases of industrial and idiopathic eczemas, Legge sounds a wise precautionary note.

Epitheliomatous ulceration was discovered in 67 persons with 9 deaths (13.4 per cent.) due to pitch, tar, and paraffin. The previous year 93 were reported with 46 deaths (49.4 per cent.), mainly among mule spinners. From 1876 to the present year the total number of known cases of skin epitheliomas in these workers has been 539. In 83.5 per cent. of these the scrotum was affected. In only 2.6 per cent. was the duration of employment less than twenty years. The actual average length of exposure to paraffin oil was forty years. The approximate death rate from this disease in mule spinners is 1.4 per thousand.

Chrome, as usual, provided a crop of nonmalignant ulcerations. Dyeing and finishing headed the list with 32. French polishing followed with 10, chrome tanning 8, and the manufacture of chrome 5. Only one of these suffered from inflammation of the mucous membrane of the nose, and the inventor of a new process using chrome chloride had a perforated septum.

Cases of dermatitis numbered 331. The main sources of trouble were dyeing, including bleaching and calico printing; then in a decreasing ratio

engineers, laborers, French polishers, bakers, chemical workers, electric platers, painters, then workers in armaments, metals, indiarubber, and wool, tanners, workers in sugar, printers, cotton workers, woodworkers, carpenters, artificial silk makers, and millers. Legge remarks that it is significant that in many of the foregoing trades the dermatitides are caused not so much by the materials handled in the actual processes, in which the men are engaged, as by the substances used by the employees to cleanse their hands. This is especially the case in certain branches of the dyeing, engineering, French polishing, and painting industries. In these occupations the hands are particularly liable to become stained, or smeared with substances difficult to remove.

In the manufacture of sheep dip, white arsenic is responsible for five cases of dermatitis and one of cancer.

Irritation of the eyes from minute traces of hydrogen sulphide gas and dermatitis from the acid used in spinning are found, in the increasingly large industry of artificial silk making.

Anthrax in this country from wool, hides, and skins has decreased more than 50 per cent. during the last quinquennial period. The figures are 1916 to 1920, 378 cases with 59 deaths; 1921 to 1926, 204 cases and 29 deaths. In horsehair and other dangerous carriers of infection, the diminution is not so marked. The treatment now relied upon, says Legge, is injection of Sclavo's serum, without the excision of the pustule.

In this too short, but suggestive report attention is drawn to the great value of exhibiting illustrated placards, as well as the official regulations, in the different works concerned. The former strike the eye and prominently draw the attention of the operatives to the hazards of certain working conditions, and induce the workers to seek early medical treatment. Legge also strongly advises a more regular and careful inspection of the hands of certain employees.

We may sum up the lessons of this and previous reports by saying that the avoidance of accidents demands (*a*) the broadcasting of the dangers which may arise in the various processes and uses of certain agents, in particular occupations, and (*b*) the importance of familiarity with the earliest oncomings of these special diseases. This being accomplished, the vagaries of the human element will, alone, be responsible for further mishappenings.—R. P. W.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

SAFETY'S TWO SONS AND THEIR SERVICE TO MANKIND. *C. F. N. Schram. Nat. Safety News, March, 1926, vol. 13, pp. 13–14.*

The fact that at present there is about twenty times as much time lost in industry from sickness as from accidental injury shows that "sickness prevention" as a factor in safety has not been given the consideration it should receive or that has been given to the other major factor, "accident prevention." The two factors must be considered together, for "either acci-

dental injury or disease may so lower resistance as to make an individual susceptible to the other."—E. O.

ARE ACCIDENTS INCREASING? *E. Stewart. Am. Labor Legis. Rev., June, 1926, vol. 16, pp. 161–166.*

In the iron and steel industry, from which the United States Bureau of Labor Statistics has for a number of years collected accident reports based on one-man hour exposure, accidents are decreasing. It is Mr. Stewart's opinion, however, that in industry as a whole they are increasing owing (1) to the employment of large numbers of new men, as is usually the case in a recovery from depression; (2) to the general speeding up of workers; (3) to better reporting; and (4) to the fact that since the war much of the accident prevention work which requires a mechanical engineer has been entrusted to the welfare departments presided over by sociologists.

Statistical information must be compiled with a view to the purpose which it is to serve. The data required by insurance carriers are worthless for accident prevention purposes. Their premium rates are based on a percentage of payroll and all that they are interested in is the number of accidents in relation to the volume of payroll.

It is impossible to compute accident rates from the statistics at present available. "To analyze accident figures so as to be helpful in the matter of accident prevention we must know where the accidents are greatest in proportion to the men employed, and to the occupation of the men employed in these places. The crude accident rate must be based upon the total employees and the number of hours they work in an industry or an establishment. The refined rate must be based upon these same factors as they apply to departments and occupations within those departments."—M. C. S.

WHAT THE ACCIDENT RECORD SHOWS. *L. W. Hatch. Am. Labor Legis. Rev., June, 1926, vol. 16, pp. 167–173.*

The author speaks from the point of view of New York State. The actual number of accidents reported in 1924 was an increase over the number reported in 1923. Data are not available, however, which would show whether the increase in accidents was greater or less than the increase in employment or in exposure to accidents. This is explained by the fact that the employment and exposure data are not required for compensation purposes and therefore must be specially collected; authority and funds for such collection have been lacking. The state department of labor is making an effort to correct this condition in New York.

A table is given showing industrial fatalities per 100,000 employees in New York factories, moving averages for five months being used. From this table it appears that the reported fatality rate goes up when employment is increasing and declines when employment is decreasing. Accidents naturally increase faster than employment because increase in working forces brings an increase in hazard growing out of the human element in accident causation. "The problem of producing a general level of safety conditions in industry high enough to prevent the rather paradoxical phe-

nomenon of an increase in industrial accident hazards in times of rising business prosperity is mainly a problem of safety education rather than of mechanical safeguarding."—M. C. S.

PROGRESS IN ACCIDENT PREVENTION. *L. A. DeBlois. U. S. Month. Labor Rev., March, 1926, vol. 22, pp. 539–541; Am. Labor Legis. Rev., June, 1926, vol. 16, pp. 174–177.*

Three methods for prevention of accidents are given as: (1) protection, or "guarding;" (2) education; and (3) elimination or reduction of the hazard itself. The success of the first and third methods are dependent on the second, which proves to be the very basis for all accident prevention, and accident prevention becomes "an educational movement requiring the establishment of a new point of view to be applied not only to our industrial activities but to every aspect of our lives."

Several points are cited showing the difficulties of national safety progress, such as the large percentage of foreign and foreign-born population, the fact that 92 per cent. of our manufacturing establishments employ less than 101 workers but that in these scattered factories there are 2,500,000 workers in all to be reached, the increasingly mechanical and mass production in industry, and the fact that the new employee is from two to five times as liable to accidental injury as the employee of longer service. The decrease in frequency and severity rates shown by statistical records of trade sections of the National Safety Council are not necessarily indicative of national progress, for the members of the sections usually represent only a small part of American industry. The significant industrial no-accident records have been made by the larger plants. These records "are not 'luck' and are achieved only after months and sometimes years of patient, plodding effort by pay-roll and salaried men alike; safety education must come first and then 'the safety spirit' before the goal is reached." American industry has proved that accidents can be eliminated, even "unavoidable" ones. When the industrial executives of the medium-sized and smaller companies learn this fact, national safety progress will be more rapid.—B. A.

WHAT FACTORS OFFER MOST PROMISE IN ORGANIZING FOR FUTURE ACCIDENT PREVENTION? *R. H. Lansburgh. Am. Labor Legis. Rev., June, 1926, vol. 16, pp. 178–182.*

The possibility for accident prevention lies in definite organization. There are three factors which offer the most immediate promise for such organization: (1) We must develop sound methods of statistical presentation. Statistics will be helpful not only in adequately presenting exposure but in presenting accident cause. Given cause analyses of accidents, all those organized for accident prevention have real goals at which to aim. (2) The activities of all those who are now working more or less separately must be closely correlated. The author, who is Secretary of Labor and Industry for the state of Pennsylvania, feels that Pennsylvania has made some progress in this respect during the last year, and he outlines its program. (3) Uniform safety codes must be adopted by the various states.—M. C. S.

ORGANIZATION TO PREVENT ACCIDENTS. *B. S. Edsall. Safety Engin., May, 1926, vol. 51, pp. 270–273.*

A safety department, with a safety director at its head, may well have centralized under it the following nine branches of work: employment, medical and hospital, accident prevention, compensation matters, fire department, police department, sanitation, welfare, and educational activities.

In order that the safety director may have the support of the management of the plant, there should be a central safety committee composed of heads of departments to meet weekly with the safety department and inspect the works once a month or oftener. Departmental safety committees should also be organized within each department, with the department superintendents as chairmen, to inspect regularly the machinery, instruct new employees, and investigate and file written reports of all accidents causing loss of time. A laboratory method for recording accidents and monthly classified accident reports should be instituted in order to learn how accidents occur and thus how to prevent them. The safety department should carry on safety education through up-to-date bulletin boards and should supervise the installation of safety devices.—B. A.

RELATIONSHIP OF FIRST AID TO ACCIDENT PREVENTION. *W. A. Booth. Safety Engin., May, 1926, vol. 51, pp. 261–264.*

"Safety First is First Aid to the uninjured. First Aid is Safety First to the injured." The writer, who is director of safety first and first aid, Canadian National Railways, deals in this address with the interrelationship of these two factors in accident prevention.—B. A.

FIRST AID OR WORST AID—WHICH? *G. R. G. Fisher. Manufacturers News, June 5, 1926, vol. 29, pp. 7, 23.*

It is in shops employing from 100 to 600 workers that Captain Fisher has observed the greatest laxity with regard to first aid matters. "Big Business" has found that it is cheaper to prevent accidents than to pay for them. It is high time, then, that the smaller shops learn to care for the "minor infections" by providing proper first aid equipment and instruction.—E. O.

FIRST AID ROOMS IN SMALL PLANTS. *Manufacturers News, June 26, 1926, vol. 29, pp. 7, 25–26.*

This outline has been compiled for the benefit of the small manufacturing plant interested in installing a first aid station, where the work is undertaken purely as an emergency measure by trained first aid men or women. The information is taken from Industrial Health Series No. 1, Industrial Hygiene Section of the Policy Holders' Service Bureau, Metropolitan Life Insurance Company.—E. O.

FLUE GAS STOPS EXPLOSIONS AT EXPERIMENTAL MILL. *Nat. Safety News, April, 1926, vol. 13, p. 16.*

A feed grinding unit for grinding oat hulls has been erected by engineers of the United States Department of Agriculture at the experimental farm at Arlington, Va., to demonstrate the practicability of using inert gas from

boiler flues for prevention of dust explosions. Tests have shown that explosions cannot occur in an atmosphere containing less than 13 per cent. of oxygen. By the introduction of flue gas, or carbon dioxide, in sufficient quantity, explosions will be prevented. Flue gas has the advantage over other gases which could be used in that it is economical and continuously available.—E. O.

EYE PROTECTION AT CHARGING FURNACE. *Nat. Safety News, March, 1926, vol. 13, p. 14.*

A pane of safety glass 18 by 24 inches and one-quarter inch thick is provided for protection of the eyes of workers at the charging furnaces in the plant of the Timken Roller Bearing Company, Canton, Ohio. Blue glass, similar to that used for melters' goggles, is set in a wooden frame, 4 inches in front of which is another frame covered with copper screen to break the heat and protect the glass. A photograph of the device is given.—B. A.

A PROTECTIVE NET. *J. Rosowsky and M. Jacobson. Gigiena Truda, 1926, no. 4, pp. 93–96.*

In cutting rivets in the car factories of the Southwest Railroad numerous serious accidents to the eyes occurred as a result of flying splinters of metal. Goggles proved inadequate and therefore protective nets were tried. The device which was found most satisfactory is described and illustrated. A net of steel wire is attached to a cap headpiece with pitched thread. A felt lining keeps the net a certain distance from the face. Two lenses, 7 mm. thick and 50 by 75 mm. in size, provide a good field of vision. The whole apparatus weighs only 402 gm. and the workers use it willingly.

In November, 1925, an accident happened in which the head of a rivet, weighing about 52 gm., flew with such force against the worker's goggles that one lens was broken into three pieces. The worker was not injured in the least, however. Nets of this kind can be used successfully in any work where there is danger from flying metal splinters.—M. C. S.

GLASS SHIELDS ON GRINDERS REDUCE EYE INJURIES. *J. A. Muir. Nat. Safety News, May, 1926, vol. 13, p. 18.*

Heavy plate glass shields which have been installed on small tool grinders in the Baltimore Works of the General Electric Company are here illustrated and briefly described. They fulfil the requirements of the safety committee in that they (1) do not distort; (2) do not frequently require renewal; and (3) compel use and are not easily detachable. During the year that they have been installed there has been a 40 per cent. decrease in cases coming to the dispensary with small particles of emery in the eye.—B. A.

IMPORTANCE OF LIGHT TO SAFETY. *W. H. Rademaker. Safety Engin., June, 1926, vol. 51, pp. 324–327.*

Illustrations are given showing the effects of good and bad lighting and the advantages and disadvantages of shadow in accident prevention.—B. A.

SAFE OCCUPATIONS FOR THE AGED WORKER. *L. J. Carey. Nat. Safety News, April, 1926, vol. 13, p. 21.*

Eight occupations are suggested as

suitable for "skilled aged workers" and twenty-one for "unskilled aged workers." "Most any kind of simple repetition work at which the operator can sit, as well as stand, and which does not require the handling, lifting or positioning of heavy parts" is given as suitable for the unskilled aged worker. Dangerous work for the man over 50 or 60 years of age is listed in eighteen occupations, chiefly those involving handling of heavy objects. The eyesight of the man of 45 or older should be cared for and his conditions of work made suitable, for "fundamentally the aged skilled worker is the safest man in the plant." Analysis of causes of compensable accidents occurring to men over 50 years of age shows that the majority of these men were employed at the wrong kind of work or under faulty conditions.—B. A.

INDUSTRIAL SURGERY

THE ANATOMY AND PHYSIOLOGY OF THE SHOULDER JOINT. *W. M. Baldwin. Indust. Doctor, June, 1926, vol. 4, pp. 94–99.*

REPORT ON MEMBERSHIP QUESTIONNAIRE ON SHOULDER INJURIES. *E. T. Wentworth. Ibid., July, 1926, pp. 102–105, 107–112.*

SOME INTERESTING SHOULDER CASES. *F. F. McGauley. Ibid., Aug., 1926, pp. 117–119.*

THE PATHOLOGY AND TREATMENT OF LESIONS IN AND ABOUT THE SHOULDER JOINT. *E. A. Codman. Ibid., pp. 121–129.*

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

HOW ENVIRONMENT MOULDS WORKERS. *G. L. Gardiner. Indust. Psychol., May, 1926, vol. 1, pp. 364–368.*

The author cites various examples to show how workers are affected by their environment and by their fellow workers. He then discusses the psychology of fatigue and the connection between fatigue and accidents.—E. O.

FATIGUE AND REST. *E. G. Martin. Indust. Psychol., May, 1926, vol. 1, pp. 345–353.*

This article, written in a popular style, gives a very interesting discussion of the questions: What is fatigue? How is it caused? What are its consequences? How is it to be dealt with? It is based on the belief, common at the present time, that most kinds of fatigue are due to the presence of sodium lactate in the tissues and blood.

In most occupations the fatigue that cuts down output is more often nervous than muscular. The first sign of fatigue, disinclination to work, develops because the mind of the worker "dwells too continuously in a narrow field, of which the work in its less agreeable aspects forms the center." "The onset of fatigue should be mini-

mized so far as possible by suitable apportionment of work and by the use of favorable incentives; also much recovery from unavoidable fatigue may be got after the work day is over, and before bed-time, by resorting to diversions, by shifting from one kind of mental or muscular work to another, or by a complete shift from mental to muscular activity or vice versa."—M. C. S.

FATIGUE IN LOCOMOTIVE ENGINEERS IN RELATION TO THE SAFETY OF EXPRESS TRAINS. *H.-F. Schaeffer. Rev. d'hyg., June, 1926, vol. 48, pp. 514–522.*

The author names as the chief causes of fatigue in locomotive engineers the noise, constant attention, violent air currents, and vibrations. He considers that the best way to lessen this fatigue is to make it easier for the engineer to see without looking out of the cab and thus exposing his eyes to the strong air currents. Measures suggested are the use of a wind shield which will protect the engineer from the air currents, and the introduction of a device on the principle of a revolving porthole so that the engineer can have a good view of the signals, etc., without leaning out of the cab.—E. O.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

ELECTRIC ACCIDENTS AND INJURIES. *Pfab. München. med. Wchnschr., June 11, 1926, vol. 73, pp. 1013–1014.*

This is an abstract of a lecture delivered before the Society of Physicians in Styria, Feb. 16, 1926.

In electric shock there is not, as with most poisons, a minimum and maximum dose. The opinion that a current of 0.1 ampere is sufficient to bring about severe injuries, and even death, is erroneous. The course which the electric current takes in the human body is not always the same. Therefore the effect of the same quality of current varies not only in different individuals but in the same person. In passing through the body, the current causes, in addition to the burns from the electric sparks, marks which show where the current entered and where it left the body, but which have no appearances of burns and which are not yet entirely explained from the pathologic-anatomic point of view. The intensity of the burns depends upon the strength of the current and the duration. Pfab emphasizes the importance for the medical practice of recognizing the fact that parts of the body which are intact after the accident may become necrotic after days or weeks. The vascular system in the first weeks is extremely susceptible to injury and inclines to thrombosis with the usual sequelae. Bones with which the current has come in contact are easily susceptible to necrosis. In addition to critical primary nervous shock giving the picture of apparent death, and cardiac fibrillation, in the subacute phase beginning neuritis and spinal affections are observed.

The author advocates strict conservatism in the treatment, excepting in cases where there is danger of death from hemorrhage.—M. C. S.

EXPERIMENTS ON THE EFFECT OF MEDIUM AND HIGH TENSION ELECTRIC CURRENTS ON THE LIVING BODY. *F. Petrusky. Abstr. as follows from Deutsch. Ztschr. f. d. ges. gerichtl. Med., vol. 11, no. 5, in München. med. Wchnschr., March 19, 1926, vol. 73, p. 503.*

This is a description of the results of numerous animal experiments which were undertaken to verify the pathologic-anatomic findings in four persons killed by electric current. For the fatal effect of an alternating current, apart from external conditions, tension, strength of current, and frequency are the decisive factors.—M. C. S.

THE PHYSIOLOGICAL EFFECTS OF CURRENTS OF VERY HIGH FREQUENCY (135,000,000 TO 8,300,000 CYCLES PER SECOND). *J. W. Schereschewsky. U. S. Pub. Health Rep., Sept. 10, 1926, vol. 41, pp. 1939–1963.*

The author explores a new field opened by recent progress in electrical technology. An excellent description of apparatus and procedure is included which should be of great value to other workers wishing to follow his lead. The author concludes in part that:

1. When small laboratory animals are placed in a box of insulating material and subjected to the action of a high frequency oscillating current in the field of a condenser resonating a tuned circuit, severe symptoms are caused which may result in death if the exposure is prolonged. Part at least, of the symptoms is due to heat retention.

2. This effect is most marked in a certain band of frequencies extending from $F = 66 \times 10^6$ cycles to $F = 18.3 \times 10^6$ cycles.

3. There is, consequently, at constant current, under the conditions of the experiments, a differential action with respect to frequency, the lethality of a constant current being in one region of the spectrum inversely and in another portion directly proportional to frequency.

4. In the band of frequencies studied, successive maxima and minima with respect to lethality occur which are most pronounced as the lower frequencies are approached.

There seems to be little doubt that the lethality of the current employed passes through a broad maximum as the frequency increases, although the experiments are hardly numerous enough to warrant attaching much importance to the secondary maxima and minima reported. The work is obviously only a beginning, for the effect of various current strengths, the identification of organs primarily affected, and other important points remain untouched. The author's suggestions as to the mechanism by which electrical oscillations may affect cells are interesting but as yet purely speculative.—H. D.

REPORT OF SENIOR ELECTRICAL INSPECTOR. *G. S. Ram. Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926, pp. 100–107.*

Great increase of electricity in factories is reported; nevertheless accidents due to this cause were fewer, numbering 414 including 24 fatal, as compared with 433 including 27 fatal in 1924. This record, which is in line with that for many years, is a

testimonial to the efficiency of protective regulations and their enforcement. The fact is stressed that alternating current at low pressure is more dangerous than direct current; out of 200 fatalities during fifteen years only three or four were cases from direct current; there is no such preponderance of alternating current supply, the reverse is rather the case; moreover, during 1922 to 1925 from direct systems not exceeding 250 volts 688 nonfatal accidents occurred as compared with 339 from alternating systems not exceeding 250 volts; in these years accidents from alternating current were ten times as fatal as those from direct current. The description given of many of the accidents demonstrates the skilful care needed to avoid risk and the carelessness too often indulged in.—E. L. C.

WOMEN AND CHILDREN IN INDUSTRY

Women's Industrial Conference, Washington, D. C. *U. S. Month. Labor Rev., March, 1926, vol. 22, pp. 616–620.*

Of special interest to industrial hygienists are the sessions of this Conference (January, 1926) on health problems and special protective legislation for women. Dr. Alice Hamilton discussed the effects on the health of women of the two most common industrial poisons, lead and benzol; Dr. Hugh S. Cummings spoke on the general public health problems of the community. Lack of authoritative data showing the effect of different occupations on a woman's capacity for successful motherhood was emphasized; trades using lead and benzol were cited as exceptions. In textile mills, studies show that loss of time through illness is greater for women than for men and that the death rates of female textile mill operatives are higher than those of female nonoperatives. No studies have yet been made that are sufficiently detailed and comprehensive showing the effect on infantile mortality of the industrial employment of the mother. With regard to special protective legislation for women, discussion pro and con revealed that certain definite improvements in the working conditions for women were aimed at by various organizations, the point of difference being how these improvements could best be obtained, whether through the trade union, through the education of public opinion and of employers, or through legislation.—E. O.

Weight-Lifting by Women and Young Persons. *S. G. Overton. Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926, pp. 85–94.*

Workers and the weights carried by them were weighed in a number of industries where weight carrying is the custom; in all, 512 women and young persons and their loads were weighed. While some information concerning the different trades is given, it is not stated in a comparable form for each, and there is an unwelcome paucity of detail. Women appear to choose smaller burdens in comparison with

body weight than young girls, and boys smaller than girls, while the younger the worker the larger is the load (compared with body weight) that is selected. But the reader is left without sufficient evidence upon which to determine the rectitude of the important conclusions drawn—*viz.*, that 40 per cent. of the body weight should not be exceeded for regular lifting or carrying, and that 50 per cent. should not be exceeded for occasional loads. The whole subject is of so much interest and importance that the publication of fuller information may reasonably be expected.—E. L. C.

ACCIDENTS TO WORKING CHILDREN IN PENNSYLVANIA IN 1923. *A. E. Lauder, E. F. Evans, and B. McConnell. Consumers' League of Eastern Pennsylvania, 1925, pp. 67.*

This report is given in two parts, the first dealing with accidents to working children under 16 years of age for the six months January 1 to June 30, 1923, and the second part dealing with accidents to working children between 16 and 18 years of age during the entire year.

In the first six months of 1923, 341 Pennsylvania children under 16 years of age were injured at their work; of these, four were fatally injured and two were permanently disabled. Of the 335 temporary disability cases 183 were compensable, that is, accidents which would keep the children out of work ten days or more. Ten of these 341 children injured were under 14 years of age—obviously illegally employed. More than three-fourths of the 341 accidents reported happened to boys, owing possibly to the fact that the more hazardous jobs are given to boys or to the reaction of boys to the monotony in some jobs. There were 18,005 boys and girls under 16 years employed in manufacturing during 1923, according to the records; over three-fourths of the accidents (267) occurring in the first six months were in these industries, chiefly in metals and metal products, with the textile and the clothing industries coming next. More than a third of the accidents were caused by machinery in the various trades, especially the textile and clothing trades; handling tools or objects ranked second in causing accidents, and falls of persons, third. Over half of the accidents reported were to the hands and arms. The greatest number of accidents occurred on Tuesday and Friday, with Friday having considerably more than Tuesday, and between the hours of 9 and 10 A.M. and 2 and 3 P.M., the morning hours having more than the afternoon.

There were 546 accidents reported for the group under 16 years of age during the second six months of 1923, making a total of 887 for the entire year.

Children between 16 and 18 years of age suffered 7,589 of the 186,018 accidents to people at work reported in Pennsylvania in 1923; 51 were fatally injured, 81 permanently disabled, and 3,771 of the temporary disability accidents were compensable. Boys incurred almost nine out of every ten accidents, and by far the greatest number of children injured were Americans. The metal industries accounted for three out of every ten accidents, with the mining industries ranking next. Handling tools and objects caused the greatest number of accidents, and machinery and falls of

persons ranked second and third, respectively. Almost half of the accidents resulted in injury to fingers or hands. The average loss of time was over one week and three-fourths.

Numerous tables show the distribution of accidents according to industry and cause of accident and nature of injury.—B. A.

INTERNATIONAL STANDARDIZATION OF ARRANGEMENTS TO ALLOW BREAST NURSING DURING FACTORY HOURS. *E. S. Ordóñez. Arch. españ. de pediat., Madrid, April, 1926, vol. 10, p. 195.*

CHILD LABOR IN REPRESENTATIVE TOBACCO-GROWING AREAS. *H. A. Byrne. U. S. Dept. Labor, Children's Bur., Pub. No. 155, 1926, pp. 42.*

A study was made of the work of 2,278 children employed on tobacco fields in Kentucky, South Carolina and Virginia, and the Connecticut Valley. Very few of the children worked less than eight hours a day, and a number of them worked ten hours. Only one-tenth of those employed in the Connecticut Valley, as compared with one-third in Kentucky and slightly more than one-third in South Carolina and Virginia, had worked at least three months. In the South the boys and girls did practically the same work; in New England the boys worked in the fields at harvest time, and the girls in the sheds.

Hand tasks, such as weeding, hand transplanting, hoeing, topping, suckering, worming, and picking, become very fatiguing when performed for a long time, owing to the position in which they must be done. The time spent in suckering and worming could be greatly reduced by selecting strains of tobacco which have little tendency to produce suckers, and by using arsenate of lead as an insecticide. In machine work continuous walking, managing the horses or mules, regulating the machines, and, in transplanting, keeping the eyes always downward, are fatiguing. Much of the work on the tobacco is done when the summer heat is at its worst and the odor of the plants is often sickening.

In the southern districts many of the children were kept out of school for farm work, and there was a great deal of retardation among them. In the Connecticut Valley, where the compulsory attendance laws are more strictly enforced, the amount of school retardation was comparatively small.—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

MINING HYGIENE. *W. Phoenix. Health, Commonwealth of Australia, July, 1926, vol. 4, pp. 114–121.*

This is a brief survey by the inspector of mines, Kalgoorlie, Western Australia, which states that the ore bodies in Kalgoorlie gold fields contain approximately 60 to 70 per cent. of silicious matter. Rock drills of the water Leyner type are in common use, although they have not entirely displaced dry drills. The experiment

of wetting the ore at the face has been tried, but the Kotzé konimeter shows that very fine dust particles are still present. Use of water alone is not sufficient; adequate ventilation is the only sure means of eliminating the dust hazard and of keeping the temperature at the proper level. A wet bulb temperature not exceeding 80°F. is required by the Mines Act, and an arbitration award has reduced this to 76°F. It is pointed out that where underground workings are extremely hot, respirations are more rapid and the lungs take in more dust than they do in normal temperatures.—M. G. P.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

PHYSICAL EXAMINATIONS IN INDUSTRY. *F. L. Rector. U. S. Month. Labor Rev., April, 1926, vol. 22, pp. 766–771.*

"The industrial physical examination has much to offer to workers. It assures them a lessened risk of injury and illness in the factory; it enables them to attain a maximum efficiency with contentment and the least possible strain upon themselves; it insures more steady employment and more stable earnings. To the employer, it gives a reduced turnover, a decreased loss in defective goods and misused equipment and machinery, a better quality of product, and a more contented and harmonious working force. To the community, it means more self-respecting, healthier, and happier citizens with less dependence upon community aid."

A list is given of a number of firms which have had preemployment physical examinations for many years.—E. O.

MEDICAL SERVICE IN INDUSTRY MAKING GREAT STRIDES. *M. W. Alexander. Hosp. Management, May, 1926, vol. 21, pp. 58–59.*

In return for $5.14 per employee for medical service in 1924, a survey of 447 plants by the National Industrial Conference Board has shown the following benefits:

1. An actual reduction in the number of accidents occurring in those plants having a fairly complete medical service as compared with plants providing little or no medical service.
2. A reduction in the number of infections resulting from injuries.
3. A decrease in absenteeism and an increase in the efficiency of the workers.
4. A stimulation of personal attention to health and a better understanding of medical science on the part of the wage earners, resulting in a general tendency to check the inception of disease and its spread.
5. An attack on one of the chief causes of poverty, through the early discovery and arrest of disabilities leading to invalidism and incapacity for work.
6. A valuable fund of information with respect to industrial diseases and accidents and the prevalence of various types of defect or disability among wage earners.—B. A.

FIRST-AID. *J. C. Bridge. Ann. Rep. Chief Inspect. Factories for 1925. H. M. Stationery Office, 1926, pp. 95–99.*

Useful information is given, based on visits made to 450 factories in connection with a desire to be exempt from providing first aid boxes because of the excellence of the ambulance room. At the ambulance room of a firm employing 6,000 persons, in one year 9,925 surgical cases, 2,694 medical, and 1,744 dental were treated. Two firms ascribed to provision of first aid a reduction in compensation claims from £100 per month to £40 per month. Not infrequently medical cases outnumber the surgical for which ambulance stations are primarily intended. The employment of trained nurses at factories is on the increase. The value of first aid training for workers is stressed. Emergency boxes, in addition to ambulance rooms, are held to be an integral part of first aid provision in factories. Preventable sepsis from lack of immediate dressing is still far too frequent. The appointment of medical officers to supervise the work is steadily increasing, as are also facilities for dental treatment and eye examinations. The keeping of records, while complied with, is apt to be made of little use, for lack of scrutiny and analysis; only by using records can accident prevention be scientifically approached.—E. L. C.

INDUSTRIAL NURSING

COTTON MILL SECTIONS OF SOUTH OFFER RICH FIELD FOR INDUSTRIAL NURSE. *B. M. Carrington. Hosp. Management, March, 1926, vol. 21, p. 64.*

The cotton mill villages of the South offer the industrial nurse an excellent opportunity for developing a generalized program, but this, the author warns, should be strictly educational.

Ways are suggested in which the industrial nurse can make herself valuable about the plant and prove to the firm that her work can be an aid to production.—M. C. S.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

INDUSTRIAL PSYCHIATRY. *M. Sherman. Arch. Neurol. and Psychiat., April, 1926, vol. 15, Soc. Tr., pp. 524–527.*

This paper deals with the problems of adjustment of individuals in industry, treating particularly the methods of study and classification of personality types used by industrial psychiatrists.

The author states that "Analysis of the theories of industrial psychiatrists shows two factors which are detrimental to the scientific advance of the problems involved. First, the work of the psychiatrist may be roughly termed individualistic; one observer may use certain methods, terms and classifications which another observer may not be able to understand.

. . . . The second detrimental factor is the persistence of the psychiatrist in using almost entirely subjective methods of study. The only method he employs, in the last analysis, is that of the interview. Such procedure is not only open to many errors, but is inadequate in that it does not lend itself well to teaching purposes, and the data secured are usually of doubtful value in research."

An interesting discussion follows the paper.—M. C. S.

JAPAN ADVANCES IN APPLYING PSYCHOLOGY. *Y. Uyeno. Indust. Psychol., May, 1926, vol. 1, pp. 369-370.*

Dr. Uyeno gives a brief outline of some of the fields in which psychology has been applied since 1916, when Japan first awakened to the practical importance of this study. There are more than a dozen factories where the Gilbreth method of motion study is applied for the purpose of standardizing the operation. Special investigations of fatigue and rest periods have been made in telegraph and telephone offices.—M. C. S.

TESTS FOR TAXICAB DRIVERS. *D. Wechsler. Jour. Personnel Res., May–June, 1926, vol. 5, pp. 24-30.*

"Dr. Wechsler here reports an experiment with tests of carefulness, of reaction time and of mental alertness, which he correlates with accident records, earnings and supervisors' ratings. The carefulness test proved to be the most effective."

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

"FIFTY-FIFTY" VACATIONS FOR WORKERS-BY-THE-HOUR. *M. R. Lott. Factory, April, 1926, vol. 36, pp. 649, 732, 734, 736.*

Vacations with pay were worked out by the Employees' Industrial Association of the Sperry Gyroscope Company, Brooklyn, N. Y., as follows: Each employee working on an hourly basis would be permitted to work twelve minutes more each day for the first five days of each week, the extra time worked each week not to exceed one hour and the total time per year not to exceed forty-eight hours, and thus accumulate one week of earned vacation. The pay for this extra hour would be at the employee's regular rate. The company would grant an additional eight hours with pay for each full year of service up to a maximum of forty-eight hours—thus providing a merit portion of vacation. The factory would be closed, with the exception of a skeleton organization, for two weeks during July or August to give opportunity for the vacations.

A modification of the plan was put into effect for 1925, as it was too late to work out the full plan; nine Saturday shutdowns were provided, however, by working extra hours. The success of the modified plan as tried insured the putting into effect of the full plan for 1926.—B. A.

VACATIONS WITH PAY FOR WAGE EARNERS IN FOREIGN COUNTRIES. *C. M. Mills. Jour. Personnel Res., May–June, 1926, vol. 5, pp. 4-23.*

The results are reported of a field investigation carried on in France, Belgium, Switzerland, Italy, Austria, Czechoslovakia, Germany, Netherlands, England, Scotland, and Wales. Provision for annual vacations with pay has, since the war, come to be a frequent practice for factory operatives as well as for salaried office employees and executives. In Germany particularly, employers have come to realize the necessity of an annual period of rest in order to obtain the maximum production from their employees.

Vacation plans of the various countries are discussed and their favorable influence on health of employees, on labor turnover, on attendance, and on punctuality are noted. Opinions vary as to the value of annual vacations in relation to production.—M. C. S.

COSTS OF EMPLOYEE MAGAZINES. *E. T. Wilkins. Abstr. in Nat. Safety News, June, 1926, vol. 13, pp. 39–40.*

This article was delivered before the Plant Publications Section of the National Safety Council at the Thirteenth Annual Safety Congress. It deals with various factors of cost in the publication of an employee magazine.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

REGULATION FOR PREVENTION OF LEAD AND GAS POISONING. *Health, Commonwealth of Australia, May, 1926, vol. 4, pp. 85–86.*

Regulation No. 14 under the Mines and Works Inspection Act of 1920, adopted in November, 1925, requires the observation of a set of special rules for the prevention of lead and gas poisoning at all mines and works, in addition to the general rules. These rules cover posting of warning notices and regulations; notification of industrial disease; storage and handling of lead materials; removal of flue dust; ventilation; provision of overalls and respirators; provision of meal rooms, change houses, bathing facilities, etc.; and duties of persons employed.—E. O.

AMENDMENT TO FRENCH LAW ON THE USE OF WHITE LEAD IN PAINTING. *Abstr. as follows from Bull. légis. Dalloz, 1926, no. 3, p. 59, in U. S. Month. Labor Rev., May, 1926, vol. 22, p. 1031.*

The French law on the use of lead compounds in painting was amended by a law passed Jan. 31, 1926.

By the terms of the amendment the use of white lead, sulphate of lead, and of linseed oil containing lead and of all special products containing white lead or sulphate of lead is prohibited in all painting of whatever nature, carried out either on the exterior or interior of buildings, except when the painting is done by the owner or the tenant of the buildings.

Penalties are provided for violations of the law.

PROHIBITION AND LIMITATION OF THE USE OF LEAD COMPOUNDS IN INTERIOR PAINTING, SPAIN. *U. S. Month. Labor Rev., May, 1926, vol. 22, p. 1032.*

By the terms of a decree of the Spanish Ministry of Labor, Commerce, and Industry, the use of white lead, sulphate of lead, and all the products containing these pigments are prohibited, except for work in railway stations and industrial establishments where their use has been declared necessary by the Ministry of Labor. Pigments which contain a maximum of 2 per cent. of lead, however, may be used. The prohibition does not extend to decorative painting or to textile work.

The employment of minors under 18 years of age, with the exception of some apprentice painters, and of women is prohibited in all painting involving the use of white lead and sulphate of lead.

The decree became effective Nov. 1, 1926.

WORKMEN'S COMPENSATION LAW OF BOLIVIA. *Abstr. in U. S. Month. Labor Rev., June, 1926, vol. 22, pp. 1278–1280.*

Not only industrial workers, but also commercial employees and apprentices in factories and workshops and those employed in forestry and agricultural undertakings when machinery is used, are covered by the law; domestic servants are not included.

Certain occupational diseases, if contracted while carrying on the work, are compensable: pneumonokoniosis; pulmonary irritation due to tobacco dust; dermatosis; ankylostomiasis; poisoning by phosphorus, copper, arsenic, carbon disulphide, or the hydrocarbon compounds of benzine, petroleum, alcohol, tar, etc.; inflammation of the eyes due to ammonia vapors; and gangrenous tumor.

An employee who is permanently and totally disabled receives compensation equivalent to two years' wages in a lump sum. An employee who is partially disabled receives compensation equal to eighteen months' wages unless the employer gives him other work suitable to his physical condition which does not pay less than his former wage, in which case the compensation benefit amounts to one year's wages. If a worker is temporarily disabled he receives from his employer compensation equal to half his regular wage during the period required for recovery.

Expenses for medicine and medical treatment both at the time of the accident and during subsequent treatment are paid by the employer, in addition to the compensation, and the payment of hospital expenses does not release him from his obligation to pay compensation.—M. C. S.

WORKMEN'S ACCIDENT INSURANCE IN ITALY, 1923. *U. S. Month. Labor Rev., June, 1926, vol. 22, pp. 1283–1287.*

Compensation is granted in all cases of death or bodily injury resulting in incapacity for work for a period in excess of five days. This consists of medical aid; in case of temporary disability, one-half of the daily wages; in case of total permanent disability, an amount equal to six times the annual earnings, and a proportionate sum in case of partial permanent disability; and in case of death, five times the annual earnings. Payment is usually in a lump sum, although in

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some cases conversion into annuities is compulsory.

The cost of compensation falls entirely upon the employer. Insurance is compulsory, but the method of insurance is not prescribed. Tables are given showing the number of workers insured with each of the five types of insurance carrier; number and percentage of accidents resulting in death or disability, 1923; comparative accident statistics for 1905 to 1923; and relation of contributions received and compensation paid in specified years.—M. C. S.

Report of Workmen's Compensation Board of Nova Scotia. *Abstr. in U. S. Month. Labor Rev., June, 1926, vol. 22, pp. 1280–1281.*

Accident Prevention. *R. B. Morley. Pub. Health Jour., June, 1926, vol. 17, pp. 285–289.*

The provisions of the Ontario Workmen's Compensation Act with regard to accidents are outlined. The employers in Schedule 1 are divided into twenty-four classes, containing about 25,000 plants. Each class is in effect a mutual insurance company, paying its entire accident cost. In Ontario eighteen out of the twenty-four classes have set up accident prevention organizations, fifteen of which have federated into the Industrial Accident Prevention Associations, with a membership of 7,500 plants. Their work is (1) inspection service in the individual plants and (2) educational propaganda. —B. A.

Workers' Compensation Act: The Medico-Legal Aspect as Applied to Insurance Companies. *L. I. Skelton. Med. Jour. Australia, June 12, 1926, vol. 1, pp. 659–661.*

The author, speaking from the point of view of the insurance companies, urges that physicians consulted in compensation cases regard the following advice in making out certificates:

1. Endeavor should first be made to determine a sufficient reason for the patient's condition from the clinical evidence, disregarding the patient's own theory of the cause of his disability.

2. In case it is impossible to arrive at an independent conclusion, that fact should be stated, adding that the disability is consistent with that which would follow an accident such as has been described.

3. The nature of the disability should be stated in technical medical terms.

4. In practically every instance, certificates should contain an estimated period of disability, and that period should be overstated rather than understated. In some cases (fractures, for example) reference should be made to the necessity for further absence from work following discharge from the hospital.

5. Physicians should be aware that disability which results from accumulated acts ("disease of gradual onset") is not entitled to compensation under the law.—M. G. P.

Some Medical Aspects of the Workers' Compensation Act. *J. Kennedy. Med. Jour. Australia, June 12, 1926, vol. 1, pp. 661–667.*

The most frequent causes of disability are discussed under the following topics: head conditions, spinal

injuries, heart conditions, pneumonia and pleurisy, hernia, lesions of the genitalia, injuries to the back, spine conditions, kidney conditions, absence of lesions, joint conditions, and industrial diseases.

Degrees of disability are described. Treatment of the injured is considered under two headings: (1) primary treatment and repair of the injury; and (2) reeducation of muscles and joints, and rehabilitation of the injured worker. For reeducation and rehabilitation the author advocates the establishment of large centers equipped to deal with these specific problems and points to the success of such establishments in America.—M. G. P.

WORKERS' COMPENSATION ACT 1926, NEW SOUTH WALES. *Health, Commonwealth of Australia, July, 1926, vol. 4, pp. 121–122.*

This Act provides for a Workers' Compensation Commission consisting of three members to be appointed by the governor. This Commission is given exclusive jurisdiction to determine all questions arising under the Act, and its decisions are final, but the Commission may state a case for the decision of the supreme court. A medical referee may be summoned to sit as an assessor with the Commission, which may submit any matter to a medical referee, or medical board, for report. The certificate of a medical board is conclusive as to the matters certified.

This Act amends the Act of 1916 in several directions:

"Injury" means personal injury, and includes a disease contracted by the worker in the course of his employment, whether at or away from his place of employment, and to which the employment was a contributing factor, but does not include a disease caused by silica dust. The right to compensation is afforded a worker who sustains personal injury on the daily or other periodic journey between his place of abode and his place of employment. The definition of worker has been considerably widened, and the term "worker" now specifically embraces such persons as mining check inspectors, shearers' cooks, etc., notwithstanding that their remuneration is paid either wholly or in part by employees themselves, golf caddies, timber contractors, cane-cutters on contract, share-farmers' salesmen on commission, persons plying for hire with a vehicle or vessel under a contract of bailment (other than a hire purchase agreement), etc.

In the case of total or partial incapacity, the compensation includes the cost of medical, surgical, and hospital treatment, required to relieve the worker from the effects of the injury, as well as of nursing, medicines, medical and surgical supplies, crutches, artificial members, and other curative treatment. The treatment is limited to three months, and the cost to £50, unless the Commission otherwise directs.

The worker is not entitled to recover amounts expended for medical treatment or services unless he has requested their supply and the employer has refused or neglected to furnish them promptly. The fees and charges for treatment are limited to those prevailing in the same community for similar treatment of injured persons. The Commission may direct a change of doctor when desirable or necessary.

—M. C. S.

WORKMAN'S COMPENSATION AND THE SURGEON. *V. W. Low. Lancet, Oct. 23, 1926, vol. 2, pp. 844–850.*

The legal history of compensation for injury and the present position is first sketched. An accident is now defined as an unlooked-for mishap or an untoward event which is not expected or designed, which has arisen out of, and in the course of, employ-

ment. The author then cites especially difficult cases, giving instances of chronic nerve disease, such as tabes or general paralysis, first becoming manifest through some trivial injury; of borderland instances of traumatic neurasthenia; of tuberculosis following upon an injury; and of osteoarthritis becoming manifest owing to trauma. This address is a useful one to which the series of cases quoted adds considerable interest.—E. L. C.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

MORBIDITY OF WOMEN TOBACCO WORKERS. *M. Kaminsky. Gigiena Truda, 1926, no. 4, pp. 36–46.*

From the morbidity figures of insured persons in Kharkov during the period October, 1922, to September, 1923, data were taken which refer to the women employees in three tobacco factories. The workers were divided into three groups: (1) those who work in rooms where large amounts of tobacco dust are present in the air—*e.g.*, workers engaged in sorting and pulverizing the tobacco, in filling cigarettes—totaling 229; (2) those employed in rooms where there is only a slight amount of tobacco dust in the air—*e.g.*, workers engaged in packing and arranging cigarettes—totaling ninety persons; (3) those employed in workrooms where the air is free from tobacco dust—*e.g.*, box and tip makers.

Tables are given comparing the data for these groups (1) with statistics for workers in the tobacco trade as a whole, and (2) with statistics for the entire industrial population of Kharkov. There were per hundred women workers among those in the chief occupations of the tobacco trade 151 cases of illness during the year, resulting in a loss of 1,067.8 days; among the total number of women workers in the tobacco trade, 155 cases with 1,107.2 days of lost time; among the women workers in all other industrial groups, 118 cases with 1,138.3 days of lost time.

Diseases of the sexual organs were especially frequent among the workers in all the groups, particularly among those in group 2. The workers in group 1 suffered most from diseases of the skin and subcutaneous connective tissues; those in group 2, from diseases of the nervous system, disturbances of the digestive organs, and tuberculosis; and those in group 3, from diseases of the nervous and the vascular systems.—M. C. S.

NUMBER AND DEATHS OF CHILDREN AS RELATED TO OCCUPATION OF FATHER. *U. S. Month. Labor Rev., June, 1926, vol. 22, pp. 1185–1188.*

A table is given showing the size of families of women aged 35 to 44 who became mothers in 1924, classified by occupation of father. The data throw light on the question of the possible relationship of the birth and death rates of children to the occupation and economic status of the father.—M. C. S.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

VOLUME IX APRIL, 1927 NUMBER 4

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GENERAL

THE INDUSTRIAL PHYSICIAN. *W. I. Clark. Canadian Med. Assn. Jour., 1926, vol. 16, pp. 269–272.*

THE PHYSICIAN IN INDUSTRY. *W. L. T. Addison. Ibid., pp. 272–275.*

BRIEFLY DRAWN DIAGNOSTIC PICTURES OF INDUSTRIAL INTOXICATION BY LEAD, BENZOL AND NICKEL. *N. Gwyn. Ibid., pp. 275–277.*

NOTIFICATION OF OCCUPATIONAL DISEASES. *O. A. Cannon. Ibid., pp. 278–280.*

Abstracted as follows in Bull. Hyg., Aug., 1926, vol. 1, p. 665.

Four articles by the above authors deal with industrial medicine. The first describes the industrial physician and his responsibility to medicine, the factory, and the community. The second, which is the report of a committee, portrays the duties of a works' physician, acting to obtain a suitable personnel and to maintain it in efficient health, insuring hygienic environment, and minimizing lost time. The third briefly draws diagnostic pictures of intoxication by lead, benzol, and nickel; the symptoms in each case are given in a useful summary. The fourth is a plea for notification of occupational diseases by doctors to local health authorities, in order that from information so obtained steps at prevention can be taken. The four articles are an indication of the need for and the spread of industrial hygiene in Canada.

QUESTIONNAIRE REVEALS LAUNDRIES' HEALTH ASPECTS. *Nation's Health, Sept., 1926, vol. 8, pp. 635–636.*

Analysis of the replies to the questionnaires sent to the health com-

missioners of twenty large American cities shows that there is no need to fear that the commercial laundries are agencies in the transmission of communicable diseases either to patrons or to employees, since over a period of years no such cases have been traced to the laundries as responsible.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

JOINT ALTERATION FROM WORKING WITH COMPRESSED AIR HAMMERS. *Holtzmann. Zentralbl. f. Gewerbehyg., Aug.–Sept., 1926, N. S. vol. 3, pp. 235–237.*

While making an investigation of the impaired hearing of boilersmiths, the author received numerous complaints regarding pains in the shoulder joint. Two cases are described and the cause attributed to the continued use of the compressed air hammer over a period of years. One case is given detailed description. The first indication was of pain in the shoulder, then a crackling sound became perceptible. Later an X-ray photograph was taken which showed an ossification of the capsule about the size of a fifty cent piece. The malady grew worse and today the man is very much hindered in the use of his right arm. He can raise it forward to an angle of about 30 degrees; to raise it sidewise is painful. The right shoulder is higher and broader than the left. A later X-ray photograph showed an extension of the ossified region and a grinding away of the head of the humerus.

These cases, which must be included under occupational diseases, do not seem to be numerous, and develop only after a long period of years.—A. W. N.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

A CARBON MONOXIDE RECORDER AND ALARM. *S. H. Katz, D. A. Reynolds, H. W. Frevert, and J. J. Bloomfield. U. S. Bur. Mines, Tech. Paper 355, 1926, pp. 35.*

This paper is summarized in part as follows:

The apparatus described has been developed to analyze and record automatically carbon monoxide when present in very low concentrations, especially that in the atmospheres of vehicular tunnels. It is based on the thermoelectric effect produced in differential thermocouples when air containing CO is passed through a catalyst of hopcalite surrounding the hot junctions of the thermocouples. Cells holding hopcalite catalyst with differential couples of 6, 12, 24, 48, and 96 pairs of couples were made. These were placed in a constant-temperature environment, usually saturated steam, and the couples were connected electrically with a recording potentiometer.

A complete unit CO recorder included a motor-driven blower for the gases, a gas cleaner and purifier of sulphuric acid, caustic soda material, activated charcoal,

filters of absorbent cotton, and fused calcium chloride drier, a flow meter arranged to maintain a constant rate of flow of gas through the cell, and copper coils for bringing the gases to the temperature of the cell environment before entering the cell. After passing through the cell the gases were wasted through a guard of fused calcium chloride to prevent entrance of water vapor. The recording potentiometer included mechanism for closing an electric circuit to ring a warning bell or operate signals as long as the CO exceeds a predetermined concentration. Some of the characteristics of the apparatus are as follows:

The gas purifier restrained all gases except CO, H_2, CH_4, CO_2, and the components of air except water vapor. Of these gases only CO and H_2 exert an important effect on the recorder under the operating conditions. The conditions can be so arranged that the hydrogen has no material effect upon the accuracy of the CO records.

The potentials generated by the cells increase regularly with the numbers of differential thermocouples employed.

The potentials first increase rapidly with increasing rates of gas flow, reach a maximum, and then decrease. The maximum potentials for different concentrations all occur at substantially the same rate of gas flow. Operation at this rate gives accuracy, highest sensitivity, and more rapid response to changes in CO concentrations.

. . . .

Hopcalite gradually deteriorated unless protected by the purifying system mentioned above. With this system no evident deterioration has occurred through a period of five months' continuous use.

. . . .

By operating the recorder cell in an environment of 25°C. and passing through it hydrogen containing traces of CO, a small uniform proportion of air being added as oxidizer, the CO can be accurately determined and recorded.

By operating the recorder cell in an environment of 100°C. or higher and passing through it air or oxygen containing small quantities of hydrogen at the best rate of flow for hydrogen, the hydrogen present can be analyzed and recorded. When hydrogen is to be determined, CO should be absent or else eliminated by a preliminary selective oxidation, which has the advantage of permitting determination of both the gases when they are present together.

Carbon monoxide in automobile exhaust gas is accompanied by hydrogen in average volume ratio of 1 (of CO): 0.4 (of H_2). This proportion of hydrogen causes an increase of 3 to 5 per cent in the analyses of CO in vehicular tunnels based on the actual CO present. A recorder operating in a vehicular tunnel thus indicates slightly higher CO than is actually present unless the calibration is modified to allow for the effects of hydrogen. Since the errors are small, however, and are on the side of safety, it is not essential to heed them.

The recorder is adapted to the determination of CO in relatively low concentrations in air. High concentrations may be determined by diluting the gases with a large definite proportion of air, say, 1 to 100, before passing them through the recorder and then allowing for the dilution in reading the concentrations.

A recorder having a cell of 48 couples has given continuous and satisfactory service at the Liberty tunnels, Pittsburgh, Pa., for five months and was still in service at the end of 1924. It records on a time chart the CO in parts per 10,000 and fractions thereof, being sensitive to about 0.02 per 10,000 (2 parts per million). The range of this apparatus is from none to 9 parts of CO per 10,000 of air. A warning bell is arranged to ring when the CO reaches a concentration of 4 parts per 10,000 or more.

This method of CO analysis is the most accurate and sensitive yet devised for small concentrations of CO in air. A sensitivity of 1 part per million is readily attained.

In addition to the foregoing, the summary contains statements on (*a*) optimum depth of hopcalite, (*b*) calibration on refitting with hopcalite, (*c*) effect of temperature and water vapor, (*d*) optimum rate of gas flow, (*e*) relation of number of thermocouples to sensitivity, and (*f*) effect of hydrogen.—P. D.

CARBON MONOXID POISONING AND THE AUTOMOBILE EXHAUST: REVIEW OF LITERATURE. *The Special Sub-Committee of the Committee on Public Health Relations. Bull. N. Y. Acad. Med., Aug., 1926, pp. 402–440.*

This report discusses different theories regarding the physiologic action of carbon monoxide, gives a short sketch of the symptomatology, and discusses tolerance and some effects of frequent exposure. Then there are a few pages on the composition of gasoline and exhaust gas; on contamination of street air; and on reported effects of the latter. The report touches on the problem of garage contamination and ventilation, and finally suggests several possible means of reducing carbon monoxide in exhaust gas, not all of these immediately practicable.

In discussion of the first topic—the action of carbon monoxide—it is stated in the summary: "Some claim that the gas is promptly dissociated or thrown off by the hemoglobin as soon as the individual breathes pure air; others feel that the combination of carbon monoxid and hemoglobin is a stable compound that is never broken down and is not discharged until the blood corpuscle meets its death." This statement, the abstracter believes, is neutral to the point of absurdity. Few facts in physiology are known with greater exactness than the conditions governing the equilibrium between carbon monoxide, oxygen, and hemoglobin, and there is no good evidence that the red cell is in any way damaged after its carbon monoxide-hemoglobin has been converted back into oxyhemoglobin. It is not a question of opinion. It is a question of demonstrable fact.—H. S. F.

PARKINSONISM FOLLOWING CARBON MONOXIDE POISONING. *R. R. Grinker. Abstr. as follows from Jour. Nerv. and Ment. Dis., July, 1926, vol. 64, p. 18, in Jour. Am. Med. Assn., Sept. 4, 1926, vol. 87, p. 790.*

An unusual degenerative change in the cerebral white matter following carbon monoxide poisoning is described by Grinker and is best termed myelinopathy. The pathogenesis of carbon monoxide poisoning is probably an initial vascular paralysis followed by asphyxia of structures having a relatively poor capillary supply. There is a definite somatotopic organization of the globus pallidus. "Psychomotor apraxia" is due to a diffuse cerebral lesion and is not of pallidal origin.—K. R. D.

THE DANGER OF MERCURY VAPOR AND AMALGAM. *A. Stock. Med. Klin., 1926, nos. 32, 33.*

THE DANGER OF MERCURY VAPOR. *A. Stock. Abstr. from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 461–466, in Zentralbl. f. Gewerbehyg., Aug.–Sept., 1926, N. S. vol. 3, pp. 257–258.*

Dr. Stock, director of the Kaiser Wilhelm Institute of Chemistry, describes his experiences with mercury vapor and the injurious effects it had on his health. He gives emphatic warning to use great care in working with this metal.

Stock suffered for about twenty-five years. At first the attacks were light and occurred at intervals, but later they increased gradually until they became almost unbearable. The

cause was recognized neither by himself nor by the numerous physicians whom he consulted. Through a fortunate accident it was discovered to be a slow, lingering poisoning from mercury vapor, with which he had been working for twenty-five years. After two years' treatment all manifestations have either entirely disappeared or are greatly diminished. The malady, which was also shared by his colleagues, began with slight headache and numbness, increased in the course of years to a continuous state of nervous unrest, and became a ceaseless torturing pain above the eyes, with dizziness and disturbance of vision. Gradually the air passages were drawn into sympathy, and the nose, mouth, throat, and ear became severely affected. Also the mind became exhausted and the memory, weak.

The remedial means adopted are minutely described; most important are a thorough house cleaning and proper ventilation of his laboratory. Plenty of fresh air is recommended.

Stock mentions other similar cases that he has known and expresses the opinion that Faraday was an unsuspecting victim of mercury poisoning. He also warns against amalgam dental fillings.

The treatise is well worth reading by everybody that works with mercury.—A. W. N.

THE DANGEROUS NATURE OF MERCURY VAPOR. *A. Schmidt. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, p. 786, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

Stock's statements concerning mercury poisoning (see previous abstract) are commended. Ventilating systems for places where mercury is present should be exhausted near the floor line, rather than from near the ceiling. —P. D.

THE DANGEROUS NATURE OF MERCURY VAPOR. *G. Pinkus. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 787–788, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

In opposition to Stock (see two preceding abstracts), it is shown that (*a*) symptoms ascribed to mercury poisoning may be caused by other things, including psychologic conditions; (*b*) large numbers of persons are employed daily in work with mercury, yet suffer no illness in consequence; and (*c*) a statistical study of persons with amalgam fillings should be made to determine whether there are really more symptoms of mercury poisoning in them than with other persons, before urging that amalgam fillings be condemned and replaced.—P. D.

THE DANGEROUS NATURE OF MERCURY VAPOR. *H. Reihlen. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, p. 788, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

Perhaps the presence of hydrogen sulphide in most laboratories counteracts the effect of the mercury, converting it into harmless mercury sulphide.—P. D.

THE DANGEROUS NATURE OF MERCURY VAPOR. *F. Gradenwitz. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 788–789, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

The small amount of surface exposed in amalgam dental fillings minimizes the danger from mercury poisoning. Care must be exercised not to have amalgam fillings in contact with other metal work (*e.g.*, bridges and other fillings) because of the electrolysis thereby set up. Attention is directed to recent publications of dental authorities questioning the validity of Stock's attacks on dental amalgams.—P. D.

THE DANGEROUS NATURE OF MERCURY VAPOR. *L. Wolf. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 789–790, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

Symptoms similar to those described by Stock developed in Wolf's laboratory workers. Inflammation of the kidneys was especially striking among women assistants. Only the greatest precautions in working with mercury, especially when the laboratory was warm, and the consumption daily of about a liter of milk seemed to act as a preventive.—P. D.

OBSERVATIONS ON MERCURY POISONING BY ARABIC ALCHEMISTS AND PHYSICIANS. *J. Ruska. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, p. 790, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3051.*

Quotations from Geber (died about 820), Avicenna (died 1283), and other Arabians are given to show that they were acquainted with the poisonous nature of mercury.—P. D.

THE DANGEROUS NATURE OF MERCURY VAPOR. *A. Stock. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 790–791, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3052.*

Reply to Gradenwitz and Pinkus (above). Amalgam fillings are always a menace.—P. D.

A FURTHER COMMUNICATION REGARDING THE DANGERS OF REFRIGERATING MACHINES. (METHYL CHLORIDE.) *F. Schwarz and H. Zangger. Zentralbl. f. Gewerbehyg., Aug.–Sept., 1926, N. S. vol. 3, pp. 246–248.*

With this article, the authors intend to supplement a contribution to this journal on the same subject by Schlegel. He, however, confined himself to the dangers attending the use of ammonia, and sulphurous and carbonic acids. The present article deals with the use of methyl chloride. This is a comparatively harmless substance and has been recently used for the purpose of refrigeration to a considerable degree. One important advantage lies in the fact that the machine occupies very little space. Herein lies also one of its dangers, because it gets placed in small closets and in dark, unventilated corners. A case is described in detail wherein nine persons were poisoned and one death occurred as the result of defective installation of a methyl chloride refrigerator.

The authors outline their procedure for the detection of the presence of methyl chloride. Experiments are minutely described dealing with chemicals, with tests on guinea-pigs and rabbits, and with suspected atmospheres. Also the method of procedure in a postmortem examination of a case of suspected methyl chloride poisoning is carefully detailed.—A. W. N.

ORGANIC SOLVENTS, THEIR POISONOUS ACTION AND RISK TO THOSE WORKING WITH THEM, AS WELL AS

METHODS OF PREVENTION. *F. Ebert. Abstr. as follows from Oesterr. Chem.-Ztg., 1925, vol. 28, pp. 176–180, in Chem. Abstr., Aug. 20, 1926, vol. 20, p. 2712.*

The following technical solvents all have more or less poisonous action: Et_2O, MeOH, EtOH, PrOH, AmOH, ketones, esters, turpentine and pine oils, benzine, benzene, toluene, xylene, chlorinated hydrocarbons, hydrogenated hydrocarbons and their derivatives and CS_2. The last is the most poisonous and dangerous of all technical solvents. Precautions for those working with these substances are given.—P. D.

POISONING FROM COPPER UTENSILS. *H. Sternberg. Abstr. as follows from Finska läk.-sällsk. handl., May, 1926, vol. 68, p. 459, in Jour. Am. Med. Assn., Aug. 28, 1926, vol. 87, p. 716.*

Sternberg warns of the danger of chronic poisoning from cooking vessels when the tin coating over copper wears off, or copper vessels are used. A polished knife blade, dipped in vinegar and then placed for an hour in the food suspected, develops a rusty deposit in the presence of copper salts. The color changes to blue when moistened with ammonia. Acute copper salt poisoning can be treated with lavage and white of egg; the chronic form, with finely pulverized iron, or iron compounds, which attract the copper out of its combinations.—K. R. D.

ON THE OCCURRENCE OF LEAD POISONING AT WELTEVREDEN. *C. D. de Langen. Abstr. as follows from Geneesk. Tijdschr. v. Nederl.-Indië, 1926, vol. 66, pp. 1–10, in Bull. Hyg., Aug., 1926, vol. 1, p. 644.*

In the course of four years de Langen saw fifty-four cases of lead intoxication at Weltevreden (Java). Fifty-two of these (forty-six chronic and six acute) occurred in typographers [type founders?], employed as such from two months up to thirty years. A clinical account is given of the symptoms, which were the usual; not commonly mentioned in recent literature on this subject is an asthmatic condition which de Langen noticed in six cases. From old clinical registers the author gathers that previously many cases may have been labeled as beriberi. He emphasizes the difficulties in the differential diagnosis from beriberi and the mutual influence of beriberi and lead poisoning on each other's clinical appearance, to which he ascribes the prevalence of paralysis of the legs in his cases. The blue line on the gums may be difficult to recognize in colored races, because pigmented spots on the gums are not rare, especially in the presence of decayed teeth. The blue line on the gums was present in many otherwise apparently healthy typographers [type founders?]; the author considers these to be latent cases. Not much value is attached to the blood picture as an aid to diagnosis.

The prevalence of lead poisoning among these native typographers [type founders?] is not accounted for by insanitary conditions in the workshops but by the unhealthy habits of the workmen themselves, who eat with their fingers and smoke cigarettes in the rest times without washing their hands. Enforcing better habits in this

respect is the principal point in prophylaxis, besides medical inspections of the labor force and informing the people about the menace of lead poisoning.

The aims of treatment (after excluding more lead entering the body) should be to eliminate the poison, which can be attained by iodide of potash, beginning with small doses, in order not to mobilize too much lead from the insoluble lead albuminate at once. Magnesium sulphate, belladonna, benzyl benzoate may be useful, the latter especially where spastic conditions predominate.

ORIGIN OF THE BLOOD CHANGES IN LEAD POISONING. *P. Schmidt. Abstr. as follows from Leopoldina, 1926, vol. 1, pp. 98–101, in Chem. Abstr., Sept. 20, 1926, vol. 20, p. 3038.*

The anemia arises secondarily from the action of lead on the bone marrow.—P. D.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

MULTIPLE OCCUPATIONAL SQUAMOUS CARCINOMA IN A GUNSMITH. *W. J. O'Donovan. Proc. Roy. Soc. Med., Aug., 1926, vol. 19, Dermat., p. 63.*

CARCINOMA CUTIS. MULTIPLE SKIN CANCERS OF OCCUPATIONAL ORIGIN. *W. J. O'Donovan. Lancet, Aug. 7, 1926, vol. 2, p. 278.*

The subject was a gunsmith by trade, aged 55. For thirty-nine years his constant work had been the reconditioning and cleaning of guns. These required the use of a large amount of Rangoon and other paraffin oils. With these his skin and clothes were always soaked.

In 1914 a small growth was removed from near the right eye. Four years later lumps appeared on the right forearm and leg, then on the left arm, both ears, and the nose. In 1923 the growth on the nose was so large that the whole of the nose required removal. In 1925 he was readmitted into hospital with multiple cutaneous nodules, about 1 cm. in diameter, on both arms.

Altogether the patient has had about fifteen separate tumors removed from the neck, chin, thigh, nose, forearm, and chest. All those which were examined histologically when under the care of the author proved to be squamous and horn carcinomas.

This case is on "all fours" with mule spinners' cancer. The average age is the same, 55 years, and the duration of employment in this gunsmith and in the cotton operatives is almost identical, forty years. Exposure to paraffin oil is apparently the cause.—R. P. W.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

PROBLEMS AND WORK OF THE GERMAN SOCIETY FOR INDUSTRIAL HYGIENE. *München. med. Wchnschr., Oct. 1, 1926, vol. 73, pp. 1667–1668.*

This report, by the director, covers the work done by the Society and the publications issued since 1924.—M. C. S.

NATIONAL HEALTH COUNCIL FILM LIST. *Prepared by Motion Picture Bur., Welfare Div., Metropolitan Life Insurance Co., 1926, pp. 98 (mimeographed).*

This list is a tentative compilation of answers to questionnaires sent in by health and welfare agencies, state boards of health, and commercial producers and distributors of health films and slides. It comprises four sections: (1) a classified list of all films, organized according to subject matter; (2) a list of local distributors by states; (3) a list of national distributors, containing name and address, and the films each distributes; (4) an alphabetical list of films by name only, with a reference number to the descriptive list.—M. C. S.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

CIRCULATORY SYSTEM

CARDIAC CAPACITY DETERMINED BY STANDARDIZED EFFORT. PRELIMINARY REPORT. *J. B. Wolffe. Arch. Int. Med., Dec., 1926, vol. 38, pp. 761–769.*

The author describes an instrument for testing cardiac capacity which fulfils the requirements of simplicity, in that it can be operated by a novice, and which is practicable, in that the data obtained are of inestimable value in determining the cardiac efficiency of the patient and records can be kept of the first and subsequent examinations.—M. C. S.

NEUROMUSCULAR SYSTEM

OCCUPATIONAL PARALYSIS. *F. Seiler. Abstr. as follows from Schweiz. med. Wchnschr., June 19, 1926, vol. 56, p. 594, in Jour. Am. Med. Assn., Aug. 28, 1926, vol. 87, p. 709.*

Seiler reviews occupational paralyses occurring in overstrained groups of muscles, and reports an instructive case.—K. R. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

BENZOL POISONING AS AN INDUSTRIAL HAZARD. *L. Greenburg. U. S. Pub. Health Rep., July 2, 1926, vol. 41, pp. 1357–1375; July 9, pp. 1410–1431; July 23, pp. 1516–1539.*

This is a review of studies conducted in co-operation with the Sub-Committee on Benzol of the Committee on Industrial Poisoning of the National Safety Council. (See THIS JOUR., 1927, vol. 9, p. 61.)

BENZOL. *Safe Practice Sheet No. 4, Nat. Safety News, Aug., 1926, vol. 14, p. 41.*

EXTENSOR WEAKNESS IN LEAD POISONING. *L. Teleky and W. Schulz. Ztschr. f. Hyg., 1926, vol. 106, pp. 394–420.*

An old clinical test for detecting early extensor weakness is to depress the overextended hand and fingers and to estimate the resistance that can be exerted by the patient. Dr. Teleky for a long time felt the need for a more delicate test and his researches into this question are embodied in this paper.

The right hand is always affected before the left, *i.e.*, in right-handed workers, and this fact is explained by Edinger's *Aufbrauchtheorie;*[1] a close connection exists between fatigue and localization of lead poisoning.

A given patient in his work is exposed to the risk of lead poisoning. If the *right extensors are found weaker than the left—viz.*, the contrary of the normal relation—one may strongly suspect early effects of the poison. In 150 controls the author found the right extensors weaker than the left in only one case. In fifty-eight inpatients chosen at random, ten had

[1] Teleky, L.: Zur Kasuistik der Bleilähmung. Ein Beitrag zur Edingerschen Aufbrauchtheorie. Deutsch. Ztschr. f. Nervenh., 1909, vol. 37, pp. 234–304.

"right extensor weakness;" it was found that eight of these were exposed to lead.

An ergograph on the lines of Mosso's instrument was designed by the authors and this enabled them to obtain quantitative measurements of the strength of the extensor muscles. The figures could be used for comparison of right and left extensors in each case; this is better than comparison of different persons, as muscular development varies so enormously. A weight suitable for one man might be too light for another. Several good photographic illustrations are given showing the position of the patient with regard to the instrument, the weight which is lifted, and the smoked drum for recording the curve; also the special apparatus for fixing the forearm and the elbow.

The curves on the drum show the height to which the weight has been lifted (usually about 5 kg.), and the number of times this was done before exhaustion occurred; within these figures it is easy to calculate the work done by the extensor muscles.

The results are tabulated and they definitely confirm the earlier clinical observation. The majority of controls show that the right extensors are stronger than the left; the opposite is the general rule in lead workers (*i.e.*, left stronger than right), even long before they show any clinical signs of lead poisoning.

The extensor muscles are picked out by the poison because they are a relatively weak group of muscles. If the mass of forearm muscles is called 100, the wrist extensors are represented by the figure 6.1, the long finger extensors by 3.3.

The authors then tested the flexor group of muscles in much the same way (hand reversed in apparatus) and obtained the opposite result. In controls, the left was stronger than the right; in lead workers, the right was stronger than the left. They believe that this is due to the tonus in the extensor muscles. In the controls the left flexors have less tonus to overcome, therefore they appear stronger; in lead workers less resistance has to be overcome on the right, as the right extensors are weakened by the early effects of the poison.—A. J. C.

LEAD PARESIS OF EXTENSORS. *Adler-Herzmark and Selinger. Abstr. as follows from Wien. klin. Wchnschr., June 10, 1926, vol. 39, p. 683, in Jour. Am. Med. Assn., Aug. 7, 1926, vol. 87, p. 453.*

Adler-Herzmark and Selinger found a unilateral weakness of extension of the hand and fingers in about a third of the lead workers examined. Other symptoms of lead poisoning were present in about one-half of them. The test is simple (overextension against the physician's hand), and deserves attention.—K. R. D.

PARALYSIS OF THE PERONEUS DUE TO INHALATION OF LEAD. *W. Jülich. Abstr. as follows from Med. Klin., 1926, no. 39, in München. med. Wchnschr., Oct. 22, 1926, vol. 73, p. 1817.*

Through the blood picture the amyotrophic paralysis of the peroneus was recognized as a result of lead poisoning.—M. C. S.

LEAD POISONING IN LEAD BURNERS. *F. Lebermann. Abstr. as follows from Med. Klin., 1926, no. 35, in München.*

med. Wchnschr., Sept. 17, 1926, vol. 73, p. 1593.

This is a report of four cases of lead poisoning in wreckers. No neurologic symptoms were observed; icterus was present in two cases. Recovery followed symptomatic treatment.—M. C. S.

EXPERIMENTAL IDIOSYNCRASY TO NICKEL. *B. Walthard. Abstr. as follows from Schweiz. med. Wchnschr., June 19, 1926, vol. 56, p. 603, in Jour. Am. Med. Assn., Aug. 28, 1926, vol. 87, p. 709.*

Since practically every worker occupied with nickel plating suffers sooner or later from eczema, Walthard selected nickel salts for experimental production of idiosyncrasy in guinea-pigs. He succeeded, although the animals showed considerable individual differences. When he reapplied nickel salts after the first eczema had healed, the reaction occurred much quicker than after the first application, even when a different part of the skin was used. The eczema flared up temporarily in some of the animals after subcutaneous injections of 1 c.c. of a 0.1 per cent. solution of nickel sulphate at a part remote from the eczema. Intravenous injections induced no shock, but a moderate shock was observed after subcutaneous injections in animals that had nickel eczema. This shock was followed by rapid recovery from the eczema in spite of continued application of the salt. Skin tests failed.—K. R. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

SYPHILIS OF THE NERVOUS SYSTEM IN THE RAILROAD EMPLOYEE. *W. H. Mayer. Abstr. from Internat. Jour. Med. and Surg., 1926, vol. 39, p. 159, in Venereal Disease Information, U. S. Pub. Health Ser., July, 1926, vol. 7, p. 217.*

The ocular palsies and coincident visual disturbances may indicate tabes dorsalis or syphilitic meningitis. The onset may be abrupt and the visual disturbance such as to render the individual incapable of service in a dangerous occupation. Sudden recurrence is the great menace.

The convulsive type in the middle-aged individual is liable to prove a permanent disability. There is no index by which to judge the probability of future convulsions.

The hemiplegic type presents an excellent outlook for treatment if it is initiated early. Recovery is often so marked that patients neglect treatment, and recurrences are much oftener difficult to relieve than the earlier type. Though the onset is often sudden, some premonitory symptoms may be found upon close supervision.

It is astonishing how long railroad employees with tabes or paresis may go on till their condition is discovered. Often the first thing that is noticed in the tabetic is disturbed vision due to optic atrophy. Tabes may be arrested if found early enough; where a colloidal gold test gives a typical paretic curve, paresis, in the author's opinion, is an irremediable condition.

The patient cannot be restored to economic usefulness by treatment.

Asymptomatic cases must be determined by the colloidal gold test as it has been standardized, especially with regard to paresis, and the author has found no instance where the clinical progress has not borne out its correctness. A clinical suspicion is not clarified by a negative Wassermann.—M. C. S.

INDUSTRY LAGS BEHIND IN THE REDUCTION OF TUBERCULOSIS MORTALITY RATE. *S. R. Bernstein. Hosp. Management, July, 1926, vol. 22, pp. 64, 66.*

This is a review of a series of papers on the problems of tuberculosis in industry which were read at one of the sessions of the Mississippi Valley Conference on Tuberculosis held in Chicago in June, 1926.

"The general conclusions drawn by all the speakers and by those who discussed the papers were that the future field of activity for those concerned with tuberculosis work is in industry and that, while the work has gone on steadily and well during the past twenty-five years, industry has shown a tendency to lag behind in the reduction of the tuberculosis mortality rate. The speakers also emphasized the point that a complete program for those who are working toward the reduction of the tuberculosis mortality must include preventive medicine, public health teaching and the aftercare of the tuberculous, as well as isolation and treatment in a sanatorium."

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

AN ECZEMA-LIKE DERMATITIS CAUSED BY WEARING DYED FURS. *G. Thibierge and J. Lacassagne. Presse méd., Aug. 11, 1926, vol. 34, pp. 1009–1011.*

This résumé is apparently the first time that fur dermatitis has been discussed in a French medical paper. It traces the earliest mention of the disease to 1914, in an American journal.

The writers think that the presence of this complaint should be recognized by its appearance, almost solely, in the winter, and by its special location. It is always seen on the lower part of the face, on the neck, and occasionally on the wrists. Reference is made to Robert's case where a rash was put down to the materials handled in an explosives factory. Later, it was shown to be due to the fur collar which this worker wore each weekend. The rash naturally assumed its greatest severity when she returned to the plant on Monday.

The article discusses seven cases, personally seen by the writers, and some alternate amines are given, which are said to be substituted for paraphenylenediamine. A short bibliography is included.—R. P. W.

INDUSTRIAL EYESIGHT EXAMINATION. *J. H. L. Smith. Indust. Welfare, Oct., 1926, pp. 325–328.*

Figures are quoted to support the claim that from 54 to 75 per cent. of any white population require spectacles to enable them to possess normal vision. In India 65 per cent. of schoolchildren are said to have visual defects. Correction of errors of refraction gave

in one department an increase in production of 27 per cent.; and in another case an increase of 15.6 per cent. Indirect benefits from correction include increased comfort for the worker; reduction in the number of accidents; and lessened irritability and friction between employees and supervisors. A strong case is made out for establishing a scheme of eyesight testing at the factory. The fittings required are comparatively inexpensive. A gain in work of one hour a week through using glasses represents 2 per cent. increase in production, which amounts to a direct yearly saving to the employer of 75/- ($15) per worker—enough to pay the cost of the scheme many times over.—E. L. C.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

THE HIGH COST OF MINOR INJURIES. *G. R. G. Fisher. Manufacturers News, July, 1926, vol. 30, pp. 27, 82.*

Two points are emphasized: (1) that the bulk of infections are traced to minor injuries, and (2) that the resultant infection is due to neglect. That compensation companies are paying from 40 to 60 per cent. for infections alone shows that minor infections are not being cared for either by the great majority of plants or by the workers. In some large industrial concerns employees who neglect minor injuries are severely dealt with or penalized. It is time that the smaller shops provided adequate first aid equipment and service. Five simple suggestions are given for real and safe first aid in the care of the so-called "trivial" injuries.—B. A.

THE INJURED WORKER'S VIEWPOINT. *H. W. Moses. Nat. Safety News, July, 1926, vol. 14, pp. 17–18.*

The answers are here given to eight questions put in personal interviews to seventy workers whose injuries involved lost time between Jan. 1, and April 30, 1926, at the Edison Electric Illuminating Company of Boston, Mass. The answers fall into two groups: (1) "those which reflect on the efficiency of the company's accident prevention program as being carried out by the foreman," and (2) "those which place the responsibility and contain constructive suggestions for the elimination of the accident hazard." The answers show that the foremen are carrying out their part in training and supervision satisfactorily. The wide range of length of employment of the injured workers is noteworthy. In answer to the question "What do you consider the cause of your accident?" fourteen men gave "carelessness" as the cause, thirteen said the accident was "unavoidable," and ten said it was due to "poor housekeeping." The rest of the replies to this question were scattered among nine other causes. The question "What do you recommend to prevent such accidents?" received the following answers: Be more careful and think more, 32; no suggestions—freely admit their own fault, 22; constructive suggestions of a diversified nature, practically all of which have been adopted by the Company, 16.

When a worker's mind is occupied with worries, whether of home or of work, accidents happen. The effect of sickness on industrial efficiency has yet to be appreciated. After a long illness a man returns to work—"light work"—it seems only fair that the foreman should "lower the standards of efficiency in favor of the injured man, until he has fully recovered." Periodic health examinations are of value in sickness prevention.—B. A.

SAFETY IN FOUNDRIES. *Safe Practices Pamphlet No. 73, Nat. Safety News, July, 1926, vol. 14, pp. 43–53; Aug., 1926, pp. 42–54.*

LOST TIME ACCIDENTS CUT IN HALF AT PULLMAN WORKS. *R. J. DeMotte and P. J. Brand. Hosp. Management, July, 1926, vol. 22, pp. 62–64.*

Comparison of records for 1923 and for 1925 shows a reduction of approximately 40 per cent. in lost time accidents in the Pullman Works. This reduction the authors ascribe to the close co-operation between the Bureau of Safety and Plant Protection and the dispensary.

New employees are taught the safe way of doing their work and are instructed in the safety and plant protection rules established. Working conditions are made as safe as possible, and employees are encouraged to report any machines, tools, etc., that may cause an injury to themselves or to fellow workmen.

The first aid stations are in charge of registered nurses, and the dispensary is under the direct supervision of a full time physician. All injuries, no matter how trivial, are cared for by competent individuals. There are no employee first aid teams. Included in the dispensary personnel are a part time oculist and a part time dentist, whose services are free to employees.

A floor plan of the dispensary and of the safety and compensation department is given and the equipment is described.—M. C. S.

PERILS OF THE SCREW DRIVER. *R. B. Northrup. N. Y. State Dept. Labor, Indust. Hyg. Bull., Sept., 1926, vol. 3, p. 10.*

Of all hand tools the screw driver suffers the most misuse and may become defective the quickest. Of fifty lost time hand tool accidents analyzed, six were caused by screw drivers and accounted for a total loss of 244 working days. Four cases were injuries to the hands, and the other two, injuries to the eyes.

Eight recommendations are proposed as safeguards in the use of screw drivers.—M. C. S.

SAFETY IN INDUSTRY THROUGH VISUAL EDUCATION. *C. T. Graham-Rogers. N. Y. State Dept. Labor, Indust. Hyg. Bull., Sept., 1926, vol. 3, pp. 9-10.*

The New York State Bureau of Industrial Hygiene has instituted a series of motion pictures "actually staged in the industries by the workers themselves and photographed by experienced practical safety inspectors to show just what happens, and how it can be prevented." The first of the series deals with bodily injuries and presents an entirely new method of utilizing the moving picture as an advance agent for safety campaigns.—M. C. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

DISCUSSION ON THE PHYSICAL AND MENTAL EFFECTS OF MONOTONY IN MODERN INDUSTRY. *Brit. Med. Jour., Sept. 11, 1926, vol. 2, pp. 472–479.*

An analogy is drawn by A. H. Davies between monotony and fatigue, wherein monotony is considered as a subjective dislike of uniformity which acts as a safeguard to mental processes. Just as opposing flexor and extensor groups hold one another in tone which is disturbed by nerve impulses causing voluntary contractions but tends to reestablish itself through the mechanism of fatigue when these impulses are too long continued, so mental processes have a normal tone which external stimuli activate into thoughts, but if these stimuli are too long continued the tendency is for monotony to interfere and reestablish the tone. Monotony acts by inhibiting the power to react to a constantly repeated external stimulus; fatigue acts by blocking the transmission of voluntary impulses to muscle fibers. Monotony, being a subjective sensation and in some ways a special case of fatigue, is elusive and well-nigh impossible to measure; it is essentially a child of repetitive work, a product of modern industrial methods, and represents that lack of interest which makes work a price that is paid for leisure. Where monotony is felt opportunities are afforded for reverie, but output (apart from fatigue) does not entirely depend on productive time; here unproductive rest pauses may increase the output of the shift. Individuals vary in mental reactions to repeated stimuli; hence much can be done by careful selection of workers, so as to obtain for repetitive work those less liable to monotony-inhibition, and thus improve the economics of production. Instances from personal observation are given in support of the arguments advanced.

According to M. Smith, monotony means "one tone," and represents absence of stimulation; it is not as such detrimental to health. But by creating boredom and a sensation of tiredness, it may bring into consciousness aches and pains which otherwise pass unappreciated; thus it acts as a negative agent weakening resistance. Happy people are seldom sick people. A process monotonous to one may be of interest to another.

"If everyone found the same things monotonous, how monotonous everyone would be," remarks T. Knowles. No work is unskilled; there is pride in method and speed of work which teamwork, companionships, and environment can stimulate. One group on repetitive work had half the sickness of others and preferred the work. Artificial discontent may be aroused by talking about monotony.

Miss Slocock held that in one sense there was no such thing as monotonous work, only a reaction to work carried on under certain conditions; and that monotony was a negative term of which interest in work is the positive. Hence modern conditions with shorter hours make workers brighter and more alert.

W. Cullis suggests that monotony connotes an unpleasurable reaction to repetition, even though no muscular

fatigue is present. Everything which fits the worker to the work, and the work to the worker, lessens monotony. Whatever increases the number of irksome stimuli increases monotony.—E. L. C.

DISCUSSION ON THE PHYSICAL AND MENTAL EFFECTS OF FATIGUE IN MODERN INDUSTRY. *Brit. Med. Jour., Sept. 11, 1926, vol. 2, pp. 479–481.*

W. L. Hichens maintained that in industry the human factor transcends all others; healthy, wise, and contented workers are a requirement for success. While the instinct of self-preservation asserts itself as fatigue before health is undermined, fatigue predisposes to disease. Physical effort should be lightened by mechanical devices, and scientific management should be humanely pursued. Study of posture and local fatigue is necessary to avoid trade neuroses. Hours of labor should be determined scientifically and not settled politically. Ventilation and temperature influence fatigue, and the influence can be measured by output. Much more research is required and the work of the Industrial Fatigue Research Board is rendering lasting services to industry.

The influence upon health and efficiency of heavy physical work was discussed by H. M. Vernon who quoted observations made in the tin plate and steel industries to support the rule that the more strenuous the work and the less favorable the atmospheric conditions, the lower is the output in hot weather owing to the fatigue produced. Instances are given of men taking twenty-two minutes per hour of voluntary rests in hot mines, but only seven minutes per hour in cool workings; and the conclusion is drawn that good ventilation particularly benefits men engaged in heavy work which causes free sweating. Further, the heavier and hotter the work, the greater is the loss of time from sickness, owing chiefly to rheumatism and diseases. Physical fatigue undoubtedly influences accident liability which in factories was found at a minimum at a temperature of 67°F.; in mines accidents were 52 per cent. higher at a deep and hot seam of coal than at a cool seam. Improved ventilation in mines should reduce the accident incidence.—E. L. C.

HEAT, COLD, AND HUMIDITY

THE IMPORTANCE OF TEMPERATURE, HUMIDITY, AND AIR MOVEMENT TO THE HEALTH OF INDUSTRIAL WORKERS AND THE PREVENTION OF THEIR HARMFUL EFFECTS. *F. Koelsch, W. Rosenthal, Spannagel, and Wenzel. Beihefte z. Zentralbl. f. Gewerbehyg., 1926, vol. 2, nos. 1–2, pp. 182.*

All those who are interested in the physiology of atmospheric conditions, particularly as these conditions affect the health of industrial workers, will find this review very informative and complete. Although it makes no new contribution, it gives an able account of the research already carried on in this field.

The topics are divided among four authors, each author specializing in a particular phase. In the first section, Koelsch discusses the physical properties of air and the physiologic effects of

atmospheric conditions. Supplementing this, Rosenthal gives a chapter on the fundamental principles of the kata-thermometer and its practical application. Most interesting of all is the section by Spannagel on the prevention of the harmful effects of high temperatures and humidities in industrial establishments. In the last section, Wenzel deals with the practical aspects of heating and ventilation in industries.

Abstracts and quotations are introduced liberally and each section contains bibliographic notes.

The bulletin ends with a general discussion.—C. P. Y.

A New Relative Humidity Recorder. *L. Behr. Abstr. as follows from Jour. Opt. Soc. America, 1926, vol. 12, pp. 623-653, in Chem. Abstr., Sept. 10, 1926, vol. 20, pp. 2765–2766.*

The theory and calculations on which the Leeds and Northrup relative humidity recorder is based are given in great detail. As a step in the work, *linear equations for relative humidity* were developed. If h = relative humidity, θ = dry bulb temperature (°C.), and t = wet bulb temperature (°C.), the following relationships agree with the relative humidity formula given by Landolt and Bornstein with a maximum deviation of 0.06° over the dry bulb range 10–40°: for $h = 0.80$, $t = 0.9410\ \theta - 1.135$; for $h = 0.60$, $t = 0.86832\ \theta - 2.195$; for $h = 0.40$, $t = 0.77570\ \theta - 3.135$; for $h = 0.30$, $t = 0.71770\ \theta - 3.495$. With a maximum deviation of 0.13° over the stated range, for $h = 0.20$, $t = 0.65000\ \theta - 3.770$.—P. D.

Practical Application of Temperature, Humidity, and Air Motion Data to Air Conditioning Problems. *Jour. Am. Soc. Heating and Ventil. Eng., Nov., 1926, vol. 32, pp. 737–748.*

In place of the two charts devised by Yaglou (see This Jour., 1926, vol. 8, p. 5), which are not mentioned here, seven full-paged tables are substituted. In the opinion of the abstracter, the original charts are simpler and more convenient in application and the substitution is unjustifiable.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

Homework in the Men's Clothing Industry in New York and Rochester. *N. Y. State Dept. Labor, Bur. Women in Industry, Special Bull. No. 147, 1926, pp. 69.*

In New York City 13 per cent. of all the workers in the men's clothing industry, and in Rochester 6 per cent., are home workers. Both inside and contract shops use home workers extensively in New York; in Rochester home work is largely concentrated among contract shops. On the basis of the shops investigated, the New York market employs approximately 5,000 home workers, Rochester 700—that is, the New York industry employs about seven times as many home workers as Rochester, but only three times as many factory workers.

During the period 1920 to 1925 inside shops increased both factory and home workers, but they increased the number of home workers at a faster

rate than they did factory workers; contractors showed a very slight increase in number of home workers as compared with a decline in general employment. No real change in the relative use of home workers was noted in Rochester.

Both inside and contract shops showed much less stability of employment for home workers than for factory workers. Home workers are thus dependent upon an industry which makes extensive use of them but which provides them with most irregular periods of employment.—M. C. S.

EFFECTS OF APPLIED RESEARCH UPON THE EMPLOYMENT OPPORTUNITIES OF AMERICAN WOMEN. *U. S. Dept. Labor, Women's Bur., Bull. No. 50, 1926, pp. 54.*

SOME RECENT FIGURES ON ACCIDENTS TO WOMEN AND MINORS. *N. Y. State Dept. Labor, Bur. Women in Industry, Special Bull. No. 144, 1926, pp. 70.*

The report is given in three sections:

"Part I is an analysis of accident statistics separately for (*a*) women and (*b*) minors in New York State for the year ending June 30, 1925. This part is purely a statistical analysis and is limited to a discussion of accidents to women and minors as to age, sex, industry, and cause of accident.

"Part II is an intensive study of accidents to minors under eighteen in the New York City district for the year ending June 30, 1924.

"Part III is an analysis of the cases awarded double compensation in the New York City district for the year ending June 30, 1924, and discusses for the first time the effect of the double compensation law."

COMPENSABLE INJURIES TO EMPLOYED MINORS IN WISCONSIN. *Wisconsin Labor Statistics, Jan.–Feb., 1926, vol. 4, pp. 8–10.*

There were 2,336 cases of compensable accidents involving minors settled during 1925 in Wisconsin. Only about 6 per cent. of these cases involved minors between the ages of 10 and 16, inclusive, the highest number (30.2 per cent.) occurring among those 19 years of age. This group also had the highest number of deaths (4 in a total of 12) and the highest number of temporary injuries lasting from 1 to 2 weeks and over 2 weeks (259 and 393, respectively). Of permanent partial disability injuries 55 per cent. occurred among minors 19 and 20 years of age, the lowest number (1.6 per cent.) among those 16 years of age. There was only 1 case of permanent total disability.

Of 613 accidents caused by machinery, metal and wood working machines caused by far the largest number; most of these injuries were temporary, although they caused 1 death and 125 permanent partial disabilities. Indemnity paid for machine accidents amounted to $92,501. Other causes than machinery were handling objects which caused 546 injuries (23.4 per cent.), hand tools 222 (9.5 per cent.), and falls of persons 203 injuries (8.7 per cent.); 25 cases (1.1 per cent.), were due to industrial disease. Comparison with compensated injuries during 1923 does not reveal any appreciable reduction or variation in causes of the injuries, the greatest reduction being among injuries due

to machinery of all kinds which claimed 28.4 per cent. in 1923 as against 26.2 per cent. in 1925. The total indemnity paid for all cases was $236,226, with $83,305 paid for medical aid.—B. A.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

FUMIGATION OF WOOLENS, JEFFERSONVILLE Q. M. I. DEPOT, JEFFERSONVILLE, IND. *H. A. Kuhn. Chem. Warfare, Oct., 1926, vol. 12, pp. 3–8.*

About 270,000 yards of Melton cloth and 30,000 yards of felt which had become infected with moths were fumigated with a mixture of hydrocyanic acid and cyanogen chloride generated *in situ*.

The building in which the fumigation took place is described in detail; the method of exposing the material, the preparation of the chambers, the generating of the gas and the amounts used, and the precautions taken against the gassing of those employed in the fumigation are given with great exactness.

The mixture of gases, hydrocyanic acid and cyanogen chloride, generated in this type of fumigation is extremely toxic to man and is very rapidly fatal. The special mask used in this work is very satisfactory, but it is essential that they be fitted by a competent man. All the men engaged in this work should be instructed in the action of the gases and impressed sufficiently with its toxicity. At least one man, preferably two, should be present who is competent to give artificial respiration. The best antidote for the cyanides is sodium thiosulphate given intravenously. During this fumigation a 5 cc syringe filled with a freshly prepared ten per cent solution of sodium thiosulphate was kept in a convenient location in the building at all times. The treatment of cyanide poisoning is very effective, but speed and efficiency in their application is imperative in order to avoid a fatal outcome. It is very desirable that every man engaged in the fumigation be in sight of at least one other man until he has left the gassing chamber.

The value of the material fumigated was over $620,000; the cost of the fumigation was about $734 and the cost of rewrapping and re-storing about $1,500.—M. G. P.

THE YEAR'S PROGRESS IN ILLUMINATION, 1925–1926. 1926 REPORT OF THE COMMITTEE ON PROGRESS. *Tr. Illumin. Engin. Soc., Sept., 1926, vol. 21, pp. 685–803.*

This is a report of 119 pages, with numerous references and an appended list of published books. The subjects treated are: gas; incandescent lamps; arc and vapor tube lamps; lamps for projection purposes; street lighting; other exterior illumination; interior illumination; photometry; physics; physiology; illuminating engineering; books and journals.—P. D.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

INDUSTRIAL PSYCHOLOGY IN GERMANY. *O. Lipmann. Jour. Personnel Res., July, 1926, vol. 5, pp. 97–99.*

This translation gives the brief survey of the work of seventeen of the chief investigators of industrial

psychology in Germany which was prepared by Dr. Lipmann for the Institut für Angewandte Psychologie in Berlin. The work is carried on by individual investigators distributed over many places, with no centralization or uniformity of program, so that the report does not claim to be complete. A list is given of the publications in which the results of the investigations have appeared.—E. O.

MOTION STUDY. *J. Younger. Indust. Psychol., July, 1926, vol. 1, pp. 486–489.*

The science of motion study as discovered and worked out by the Gilbreths is here briefly described. Work is made up of multitudes of "molecules of motion;" a molecule of motion being described as "the complete cycle of a motion from start to finish ready to start again." The science of motion study is thus analogous to the atomic theory of chemistry, and is called, more exactly, "micromotion" study. To the atom of motion is given the name "therblig." Each cycle of motion, or molecule, should be made up of correct minute parts of the cycle, or therbligs, otherwise there is lost motion or waste. Researches have been made into various lines of work from that of bricklayers to that of skilled surgeons; the work curves resulting serve to indicate how the work can be done with elimination of waste efforts and with less fatigue. Much work has also been done in studying the peculiar problems of the physically handicapped, so that machines can be fitted to suit their altered curve of motion and thus equip them to meet their more fortunate coworkers in competition.—B. A.

DREAMS AND THE JOB. *L. Pruette. Indust. Psychol., July, 1926, vol. 1, pp. 490–492.*

In general it is said that "workers who are greatly interested in their jobs will show an unusually high percentage of dreams connected with the occupation." Dreams related to the jobs of cashiers in large department stores of New York City are given.—E. O.

MALINGERING

AN UNLEARNABLE PRISM TEST FOR SUSPECTED MONOCULAR MALINGERING. *E. H. Schild. Am. Jour. Ophth., Oct., 1926, vol. 9, pp. 741–743.*

"A prism and plate of glass with parallel sides are so combined that either can be held before the claimant's good eye and changed without his knowledge. Skilfully used it reveals any false claim of monocular blindness and can be made to show how much vision the alleged blind eye really has."

SIMULATED BLINDNESS AND ITS DETECTION. *M. A. Lischkoff. Abstr. from Jour. Florida Med. Assn., vol. 3, pp. 204–206, in Am. Jour. Ophth., Oct., 1926, vol. 9, pp. 792–793.*

The author describes a number of tests, including color tests, which he uses to detect malingering. Interested readers are referred to original or to the abstract in the the *American Journal of Ophthalmology.*

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

SUCCESSFUL FACTORY CAFETERIAS. *C. A. Schutte. Manufacturers News, July, 1926, vol. 30, pp. 25, 71.*

"The difference between an unsuccessful factory cafeteria and a successful one is the fact that in the first the employes eat, and in the other they enjoy eating." The proper selection and preparation of food and an atmosphere of "cheerful cleanliness" are necessary factors. Vitrolite is advocated for table tops, counters, walls, etc., as being both attractive and economical, on account of a minimum cost for cleaning.—B. A.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

BELGIAN LAW PROHIBITING USE OF WHITE LEAD IN INTERIOR PAINTING. *Abstr. from Bull. Comité central indust. de Belgique, May 5, 1926, pp. 639–640, in U. S. Month. Labor Rev., July, 1926, vol. 23, p. 63.*

A law passed in Belgium, March 30, 1926, effective six months from that date, prohibits the sale of white lead and other pigments or colors containing white lead and their use in painting the interior of buildings or in painting any article to be used in the furnishing of buildings. White pigments of any kind may not contain more than 2 per cent. of metallic lead by weight. Certain exceptions are allowed. The dry scraping and sandpapering of surfaces painted with white lead paint are forbidden. Violations are penalized.

REVISED FACTORY LAW. *Japan Letter, Jour. Am. Med. Assn., Aug. 7, 1926, vol. 87, p. 426.*

The revised factory law, which was put into force July 1, protects minors and mothers mainly in accordance with the agreements made at the international labor conference held at Washington in 1919. According to the new regulations, minor employees must be more than 15 years of age, while their working hours are shortened by an hour to two hours a day. Mothers are allowed four weeks before and six weeks after childbirth. Four more weeks' rest may be obtained on a physician's order. They are allowed to nurse their babies for thirty minutes twice a day.—K. R. D.

RECIPROCAL WORKMEN'S COMPENSATION AGREEMENT BETWEEN ARGENTINA AND AUSTRIA. *U. S. Month. Labor Rev., July, 1926, vol. 23, p. 69.*

An agreement was put into effect March 22, 1926, providing that workers of one of the contracting countries, Argentina and Austria, who are injured in the territory of the other shall have the same right to compensation which the local law concedes to its nationals. Government officials of both of the contracting countries are to notify the consuls of the other country as to the number of fatalities due to industrial accidents which have occurred in the respective countries.—E. O.

LABOR LEGISLATION OF 1925. *U. S. Bur. Labor Statistics, Bull. No. 403, March, 1926, pp. 92.*

NEW YORK STATE WORKMEN'S COMPENSATION LAW, WITH AMENDMENTS, ADDITIONS AND ANNOTATIONS TO AUGUST 1, 1926. *N. Y. State Dept. Labor, Indust. Commission, pp. 131.*

THE DEGREE OF WORKING ABILITY RECOVERED AFTER FRACTURES, AS ESTIMATED FROM PENSION GRANTS. *Rieger. Abstr. as follows from Arch. f. Orthop. u. Unfallchir., 1926, vol. 24, no. 2, in München. med. Wchnschr., July 16, 1926, vol. 73, p. 1209.*

This is a statistical report based on the records of the agricultural and forestry association of Lower Franconia of 1,400 cases of fracture treated by a great many different physicians. The end result is in general not especially good. "Quick recovery, so that sick benefit is unnecessary, is attained in only a minority of cases." "The majority of accident cases have, to be sure, gradually recovered complete working ability, but many of them only after a long period during which large benefits have been paid." A lifelong pension was received by 416, or 29.7 per cent. (thirty-seven, or 21 per cent., of 176 fractures of the radius, and sixty-three, or 60 per cent., of 105 fractures of the femur).—M. C. S.

OLD-AGE INSURANCE OF IRREGULAR AND MIGRATORY WORKERS IN BELGIUM. *Abstr. from Bull. Comité central indust. de Belgique, Feb. 10, 1926, pp. 270–274, in U. S. Month. Labor Rev., July, 1926, vol. 23, pp. 69–70.*

The provisions of the law passed Dec. 10, 1924, in Belgium, providing for the compulsory insurance of workers against old age and premature death, were extended by decrees of Jan. 5 and 6, 1926, to irregular or migratory workers occupied in loading and unloading and repairing ships and boats and to workers employed by the day or half day at the homes of several employers. Terms of payment are specified.—B. A.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

INDUSTRIAL FATIGUE IN CONNECTION WITH TUBERCULOSIS. *E. L. Collis. Tubercle, Nov., 1926, vol. 8, pp. 49–58.*

Mortality statistics provide the only reliable measure of the incidence of tuberculosis, a disease with an aberrant mortality curve which falls away as old age approaches. Fatigue is pathologic only when persisted in to a stage of overstrain, and no evidence exists that it exerts any immediate influence in lowering resistance to infection. Of the three periods of life—infancy, early adult life, and middle age—attacked by tuberculosis, each exhibits a different clinical type of the disease. Overstrain does not affect infancy, or, to an appreciable degree, early adult life; moreover, infection is the influence dominating infantile tuberculosis, while infection associated with malnutrition dominates early adult life. Overstrain, resulting from chronic fatigue, engenders pathologic wear and tear by middle life and is

associated with an exacerbation of pulmonary tuberculosis, especially among males who have been exposed in earlier life to the overstrain of industrial occupations. This type of tuberculosis is seen in an exaggerated statistical form among workers whose lungs are damaged by silicosis, caused by inhaling silica dust; it is associated with high mortalities from other pulmonary diseases.

THE DEATHS OF MERCHANT SEAMEN IN 1924. *W. E. Home. Proc. Roy. Soc. Med., Aug., 1926, vol. 19, Epidem. and State Med., pp. 95–103.*

The author analyzes the latest return of shipping casualties and deaths on vessels registered in the United Kingdom, and points out, as he has done on many occasions previously, how incomplete is the available information for the purposes of vital statistics (see also THIS JOUR., 1926, vol. 8, Abstr. Section, p. 223). Thus the death of a seaman suffering from phthisis, enteric fever, or pneumonia at the moment of his discharge in home waters is not included; the deaths so missed explain why accidents account for 446 deaths as against 374 due to disease, while pneumonia only accounts for some 5 per cent. of all deaths and deaths from "tubercle" for 4 per cent. On the other side there is uncertainty as to the size of the population at risk. An effort is made to calculate a probable population for 1924 from a liability to death from accident which is estimated as fivefold that of "All Males." When comparison is made with records of previous years (1901 and 1902), the figures for pneumonia and tuberculosis are found to remain the same for lascars, who are still allowed only 72 cubic feet statutory space, while the figures have declined 20 per cent. and $33\frac{1}{3}$ per cent., respectively, for British seamen who now have 120 cubic feet. The greatest decrease is in deaths from alcohol. Attention is directed to the slow progress of sanitary requirements in the Merchant Shipping Acts and to their inferior standard. The Board of Trade hardly seems organized for supervising the health of merchant seamen but rather to represent unqualified practice in hygiene.—E. L. C.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

THE OCCUPATIONAL DISEASES OF BOILER MAKERS WORKING WITH PNEUMATIC INSTRUMENTS. *Arb. d. Leningrad. Inst. z. Studium d. Berufskrankh., 1926, vol. 1, pp. 359.*

In the Institute for the Study of Occupational Diseases at Leningrad, 464 boiler makers who work with pneumatic instruments were given a thorough clinical examination. They were divided into three groups: (1) those engaged in this work for less than ten years (178 men); (2) those so engaged for from ten to nineteen years (152 men); and (3) those so engaged for twenty years and over (134 men). Only one-fifth of the workers had been employed steadily as boiler makers; the remainder had followed various trades, some of them changing five or six times. In the majority of cases work had been interrupted by military service, lack of employment, and other factors which were not without effect on the health.

Ears.—The generally recognized deafness of boiler makers was confirmed. It was found that:

1. Diseases of the middle ear in certain measure protect the inner ear from injury. Applicants suffering

from otitis media are therefore not to be rejected.

2. Wearing cotton in the ear has no effect on deafness of boiler makers. Of 464 boiler makers, sixty-five wore cotton in their ears during work, but they were no less deaf than the others. The cotton does not entirely close the ear and the sounds are not excluded altogether.

3. Interruptions in the work have no effect on deafness of boiler makers. The degree of deafness corresponds to the total length of time which has been spent in the noise.

4. Deafness comes on more quickly in older workers than in the younger ones.

Teeth.—Carious teeth are relatively rare among boiler makers. As a result of grinding their teeth together during work, however, sound teeth become worn down and through atrophy of the alveolar process become loosened. Worn off and loose teeth are from three to three and one-half times as frequent among boiler makers as among workers in other trades.

Eyes.—About 50 per cent. of the workers employed less than ten years, and 75 per cent. of those employed more than ten years, showed corneal opacity as a result of injuries from metal splinters. Lesions found were for the most part slight; workers with severe injuries had been forced to leave the trade. The older the person injured, the more severe the course of the corneal injury and the greater the scar left.

Bones and Muscles.—A high percentage of the men showed increased flexibility of the spinal cord. The bones and joints of the hand showed no changes. In fifty cases X-rays of the right hand were made but no changes were discovered. Flat foot was no more frequent than in any group of persons who stand at their work. Chronic muscular rheumatism was present in only 1.5 per cent.—a surprisingly low percentage, in view of the fact that the working conditions are such as favor onset of rheumatic diseases; workers with severe cases had apparently been compelled to give up their work.

Muscles of the hands showed subnormal tonus and increased mechanical sensitivity. Tests carried on in the workroom showed increase in muscular strength after work. Dynamometric tests in the laboratory showed that the muscles of the right hand were most affected, the difference between the two hands being greater than in other occupations.

Heart and Vascular System.—In half of the group the heart and the vascular system showed hypotony as a result of atony of the vessel walls. The cause was not determined. It is possible that this is brought about by the constant vibration of the instrument in the hands of the worker. Bradycardia (pulse less than 60 beats a minute) occurred relatively often—in 38 per cent. of the workers in group 1, in 41 per cent. of those in group 2, and in 52 per cent. of those in group 3. In 23 per cent. of the cases bradycardia and hypotony were both found.

Organic lesions of the vessel walls of arteriosclerotic nature were numerous, and were more frequent the longer the worker had been engaged in this occupation. There seemed to be a general decrease in tonus involving the heart and the vascular system. The authors are inclined to ascribe this to

the vibration of the instrument in the worker's hand. The vibration may bring about a change in the tonus and hasten the wasting of the vessels.

Varicose veins occurred in 6.5 per cent.—a low percentage considering that boiler makers stand at their work, but undoubtedly explainable by the fact that only those physically fit are accepted for employment. In eleven cases dilatation of the veins in the forearm was discovered—eight in group 1, three in group 2.

Respiratory Organs.—Respiratory organs were, in general, in good condition. Active tuberculosis was detected in only 1.6 per cent. Including inactive forms, the percentage was 23. Emphysema of the lungs was present in 2.6 per cent. Diseases of the upper respiratory tract were no more frequent than in the general population of Leningrad.

Hernia.—Hernia was present in 20 per cent. The percentage increased with the length of employment.

Nervous System.—The authors expected to find increased tremor of the hands as a result of the constant vibration of the instrument. On the contrary, tests carried out in the workroom, and also tests in the laboratory with an apparatus especially constructed, showed a greater steadiness of the hands than in workers in other trades. Alcoholism has a greater effect on tremor of the hands than has occupation. The same is true of neurasthenia. Neurasthenics are no more frequent among boiler makers than among other workers. It might be expected that the noise would play a certain rôle in the etiology of neurasthenia, but if that were the case boiler makers affected with deafness would show a lower percentage of neurasthenics; instead, the reverse was true.

Lesions of the peripheral nervous system apparently are more closely related to occupation than is neurasthenia. Neuritis and neuralgia of the extremities in a number of cases could be traced to trauma; in other cases overstrain in work seemed to be the cause. The right arm and the left leg were exclusively affected. Diseases of the peripheral nerves were found in only 6 per cent. In severe cases the workers could not, of course, continue their trade. Here, as in numerous other cases, the observations embraced only a fraction of the actual facts, since the workers who had given up their trade because of impaired health could not, unfortunately, be included.—M. C. S.

THE INTERNATIONAL CONFERENCE IN OSLO ON THE HEALTH OF THE MERCHANT SERVICE. *F. Humbert. World's Health, Oct., 1926, vol. 7, pp. 385–392.*

Some indication is given of the proceedings of the Conference held at Oslo. With reference to the need for supervision of the health of merchant seamen, whose death rate is known to be high, particularly from accidents, pneumonia, and tuberculosis, the Conference, after giving careful consideration to many points, finally made certain practical recommendations. It held that bureaus for furthering the health and general welfare of seamen should be established in all seaports of the world, located in a prominent position at the waterside. Their duties would be to furnish treatment, or information as to where advice

and treatment could be secured, and information as to local recreational and social facilities. The bureaus should be distinguished by a common badge, and the initiative for establishing them should be taken by the Red Cross Societies. The Conference further recommended the League of Red Cross Societies to invite the International Labour Office, the Health Organization of the League of Nations, and other international organizations to appoint a standing committee on the welfare of seamen, intrusted with investigating facilities for medical treatment for seamen, and welfare conditions on board and in port.—E. L. C.

PRESIDENTIAL ADDRESS ON SOME OBSERVATIONS ON THE SCOPE AND VALUE OF INDUSTRIAL HYGIENE. *C. C. Wakefield. Jour. Roy. San. Inst., Dec., 1926, vol. 47, pp. 419–422.*

Regard for industrial comfort and welfare in early civilization, such as in the erection of Egyptian pyramids or in the construction of Stonehenge, must have been of secondary consideration. Man as a source of energy was then used as a slave sacrificed to human development. Regard for industrial welfare is a modern development and its value is a modern discovery. Today the doctrine of the supreme sacredness of human life is not in question. Man is called upon to give more and more skilled craftsmanship, as well as concentrated attention, to the rapidly working machine. Continued progress depends on human efficiency, and human efficiency in turn on good health and contentment. The worker must also be safeguarded from direct injury, whether due to physical force or to some industrial poisoning. The goal of the industrial hygienist, if attained, will advantage national prosperity as well as the physical improvement and increased happiness of the citizen.—E. L. C.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

THE PROTECTION OF ENCLOSED SPACES FROM NOXIOUS GAS. *M. E. Barker. Chem. Warfare, Dec., 1926, vol. 12, pp. 2–4.*

Air is blown into the "enclosed space" through a filter which removes toxic gases and smokes.—P. D.

TOXIC SMOKES. *Chem. Warfare, Dec., 1926, vol. 12, pp. 5–10.*

An outline of the physical chemistry, toxicology, and first aid treatment of "D. A." (diphenylchlorarsine) and "D. M." (diphenylaminechlorarsine).—P. D.

CARBON MONOXIDE AND HYGIENE. *M. Nicloux. Ann. d'hyg. pub., indust. et soc., 1926, vol. 4, pp. 637–663.*

This paper, delivered at an industrial and social congress, presents a useful summary of present knowledge with regard to carbon monoxide, to which the author has himself paid considerable attention. He first restates the way in which carbon monoxide acts on the blood, combining with hemoglobin and displacing oxygen. At the same time he stresses the fact that, according to the law of mass action, oxygen can in its turn again cap-

ture the hemoglobin. The amount of hemoglobin to be found at any time in combination with oxygen and with carbon monoxide depends on the proportions of the two gases present in the atmosphere breathed. Experience shows that when the proportion of carbon monoxide present is about 1 part per thousand of air, then about 50 per cent. of the hemoglobin is seized upon. The author considers that an atmosphere containing more than 1 part of carbon monoxide per 5,000 parts of air cannot be continuously breathed with impunity; he places the limit of hemoglobin which can be placed out of action by carbon monoxide as between 20 and 30 per cent. He agrees with other workers that the symptoms caused by carbon monoxide poisoning are practically entirely due to lack of oxygen, *i.e.*, to anoxemia. The longer a subject is exposed to an atmosphere containing carbon monoxide, the more pronounced are the resulting symptoms, but physical exercise enables the carbon monoxide to gain access to the tissues more rapidly than when the subject is at rest.

A list of twenty-four possible sources of carbon monoxide is given, all of which occur in the domain of industry. There is, however, also risk from carbon monoxide in ordinary life, due to escape of illuminating gas, whether used for lighting, for heating, or for cooking. Locomotives foul the air of tunnels, and motor cars discharge carbon monoxide in exhaust gases; the latter is an increasing source of danger, especially in small closed garages. Combustion, in contrast to detonation, of powder and high explosives is another source of carbon monoxide which, particularly in mining, may escape recognition; after explosions in mines, the galleries are usually highly charged with this poisonous gas.

The treatment of cases overcome is essentially that of artificial respiration in fresh air. Such action should never be delayed, but when oxygen is available, its use is a help. Dr. Nicloux also considers that the presence of 5 per cent. of carbon dioxide in the oxygen may be admitted with possible advantage, although he holds that this matter calls for further investigation. The article contains references, to work done not only in the United States and Great Britain, but also in France; work done in the latter country has tended to escape notice.—E. L. C.

Gas Mask Protecting against Carbon Monoxide. *K. Bunte. Abstr. as follows from Gas u. Wasserfach, 1926, vol. 69, pp. 815–816, in Chem. Abstr., Nov. 20, 1926, vol. 20, p. 3757.*

The upper limit of the mask is 6 per cent. carbon monoxide, its life at 0.1 to 0.7 per cent. carbon monoxide is 20 to 30 hours, the filling not being specifically described.—P. D.

Garage Accidents. *Lancet, Nov. 20, 1926, vol. 2, p. 1095.*

The majority of garage accidents are due to poisoning by exhaust gases, *i.e.*, by carbon monoxide. Frequently fatalities are wrongly ascribed to apoplexy, epilepsy, or petrol poisoning. A concentration of 1 part of carbon monoxide to 1,500 parts of air is dangerous; coal gas contains from 5 to 10 per cent. of carbon monoxide;

motor exhaust gases contain 14 per cent. or over. Three per cent. will rapidly produce acute poisoning. Every place where cars are stored should have ample communication with outside air. The running of engines in garages should be forbidden, and warning notices should be exhibited in all garages.—E. L. C.

CARBON MONOXIDE POISONING. *D. Kerr. Lancet, Dec. 11, 1926, vol. 2, pp. 1218–1220.*

Carbon monoxide is being used to an increasing extent as a means of suicide. For thirty years ending 1895 no such case occurred in Edinburgh, but from 1920 to 1925, 30 per cent. of suicides were due to inhalation of coal gas. In England the number of suicides by this means more than trebled in the last six years. The postmortem formation of nitroxyhemoglobin may lead to mistaken diagnosis, since this compound also presents the cherry red color distinctive of carbon monoxide in the blood. A saturation of 50 per cent. causes malaise and weakness, 55 per cent. causes "difficulty in walking;" beyond this, unconsciousness supervenes. Immersion in an atmosphere containing 22 per cent. of carbon monoxide causes unconsciousness theoretically in thirty seconds. Publicity given to cases of suicides had a bad effect, because they suggested this means to the susceptible. Dr. Kerr advocated the use of 5 per cent. of carbon dioxide in the oxygen used for artificial respiration in the treatment of carbon monoxide poisoning. He had seen lesions in the brain after coal gas poisoning.—E. L. C.

DUST HAZARDS AND THEIR EFFECTS

TESTING AIR FILTERS. *Aerologist, Nov., 1926, vol. 2, pp. 19–21.*

A simple new device (the Reed Visual Dust Comparator) for testing air filters "consists of a white opaque celluloid wafer with an oval depression in the center. The shape and depth of this depression, as well as the size and location of the air outlet hole, have been carefully worked out by experiment to secure proper contact of the air with the concave surface of the depression." The depression of the comparator is lightly smeared with vaseline, one comparator is suspended in front and one behind the air cleaner, with the greased depression facing the air flow. The dust particles impinge upon the coated surface of the comparator, and thus the efficiency of the air cleaning installation may be estimated from the condition of the comparator behind the cleaner. The testing period should ordinarily cover about twenty-four active hours.—M. G. P.

A RELATIVE METHOD FOR DETERMINING PARTICLE SIZE OF PIGMENTS. *G. F. A. Stutz and A. H. Pfund. Indust. and Engin. Chem., Jan., 1927, vol. 19, pp. 51–53.*

The amount of light transmitted by a suspension is photometered and used as a measure of the average particle size of the suspended material. The authors studied nine different grades of zinc oxide ranging in size from

0.125 to 1.18 microns in average particle size and found that a definite relation between particle size and opacity of the suspension was obtained. The method possesses the advantages of accuracy and permits determinations to be made in about ten minutes. The curves determined for zinc oxide cannot, however, be applied to a different substance.—P. D.

THE RELATION OF YIELD VALUE TO PARTICLE SIZE. *H. Green and G. S. Haslam. Indust. and Engin. Chem., Jan., 1927, vol. 19, pp. 53–57.*

PARTICLE SIZE AND DISTRIBUTION BY SEDIMENTATION METHOD. *J. H. Calbeck and H. R. Harner. Indust. and Engin. Chem., Jan., 1927, vol. 19, pp. 58–61.*

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

DERMATITIS FROM HANDLING FLOWER BULBS. *S. G. Overton. Lancet, Nov. 13, 1926, vol. 2, p. 1003.*

In the course of her inspectorship Dr. Overton found that a small proportion of the sorters and packers of tulip bulbs were suffering from dermatitis. It was restricted to the fingers. The nails themselves were unaffected, but the skin around and beneath them was split and painful. This had to be prevented either by wearing gloves or by finger stalls. In two large firms distributing narcissi, hyacinths, and daffodils, the sorters and packers only occasionally suffered from a frictional uneasiness.

Both the author and Dr. Bridge were able to verify the presence, in tulip bulbs, of an acrid juice by squeezing some out of the bulbs and applying it to their skins. It provoked irritation, or a perinychial or hyponychial inflammation.—R. P. W.

SIDEROSIS BULBI. *M. P. Motto. Am. Jour. Ophth., Nov., 1926, vol. 9, pp. 801–803.*

A patient without history of injury presented a perforation of the iris, traumatic cataract, exudative pupillary membrane, and beginning siderosis. The Ohio State Industrial Commission disputed his claim for a period of two years because the several ophthalmologists who examined him could not agree that the eye condition was directly due to trauma. The slit lamp microscope was the deciding factor in bringing to view the site of injury in the cornea and the patient was immediately awarded compensation for the total loss of the eye. Removal of the eye showed that siderosis extended to the iris and lens but no foreign body was found. The injury was probably received when the patient was hammering on enameled steel.—M. C. S.

A CASE OF ELECTRIC CATARACT. *J. J. Horton. Am. Jour. Ophth., Nov., 1926, vol. 9, pp. 841–842.*

This case occurred in a coal miner who, while digging coal early in May, 1925, was knocked unconscious when an electric wire carrying a current of only 220 volts came in contact with the metal lampholder of his cap. There were deep burns about the right eye but no signs of injury of the left eye.

On August 12, the patient's employer sent him to Dr. Horton because he claimed not to be able to see with his right eye. He made no complaint of his left eye. A needling was done on this date and another two weeks later, and the patient was apparently progressing nicely. During Dr. Horton's absence, however, he was sent to another oculist who did a cataract extraction which left the patient with high astigmatism. Dr. Horton believes that needlings and time would have been sufficient for complete absorption of the lens and that extraction with resulting high astigmatism was unnecessary.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

METAL-MINE ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1924. *W. W. Adams. U. S. Bur. Mines, Bull. 264, 1926, pp. 97.*

Practically the same number of men were employed in the industry in 1924 as in 1923 but there was a decline of about 2 per cent. in the working time. There were reported 33,536 accidents, including 418 deaths; 10 injuries resulted in permanent total disability, 402 in permanent partial disability, 8,398 in temporary disability exceeding fourteen days, and 24,308 in temporary disability not exceeding fourteen days but lasting beyond the day on which the accident occurred. The only significant variation from the record of 1923 was in fatal accidents which resulted in a higher death rate in 1924 mainly because of the Milford mine disaster in Minnesota.

Underground and open pit operations showed an increase in the injury and fatality rates as compared with 1923; surface shops and yards showed a reduction. Analysis of the fatality rates according to the principal metals produced by the mines showed that nonmetallic mineral mines had a lower rate in 1924 than in 1923. The greatest reduction in nonfatal injury rates was for lead and zinc mines in the Mississippi Valley and for nonmetallic mineral mines in various states.

The statistical data are presented in fifty-six tables which do not lend themselves to abstraction. Interested readers are referred to the original bulletin.—M. C. S.

ACCIDENTS AT METALLURGICAL WORKS IN THE UNITED STATES DURING THE CALENDAR YEAR 1924. *W. W. Adams. U. S. Bur. Mines, Tech. Paper 395, 1926, pp. 36.*

In comparison with the report for 1923, the data for 1924 show a reduction in the fatality and injury rates, an increase in the number of men employed, and a larger volume of work measured by man days of labor performed in the milling and smelting industry.

The frequency of accidents per thousand full time, or 300-day, workers in 1924 was 0.87 for fatalities and 131 for nonfatal injuries, as compared with 0.97 and 142, respectively, in 1923. The average time loss equivalent per accident, including deaths as well as injuries, was seventy-three days in 1924 and seventy-eight days in 1923.—M. C. S.

J. I. H.
June, 1927

ACCIDENTS IN THE CALIFORNIA PETROLEUM INDUSTRY IN 1923. *H. C. Miller and C. E. Steidel. U. S. Bur. Mines, Tech. Paper 382, 1926, pp. 30.*

For the purpose of this report the industry is divided into four branches —drilling and producing, pipe line work and transportation, refining, and sales and marketing—for each of which data are given showing (1) the cause of the accidents; (2) the part of the body affected; (3) the time lost in days; (4) and the occupation of the injured.

This report is published for the purpose of making available a reliable basis for the work of safety engineers and others interested in the prevention of accidents in the petroleum industry, and in the hope that it will aid the establishment of a uniform method of presenting facts statistically so that the progress in accident prevention may be accurately gaged and fair comparisons made between companies in the same state or in other states and between the industry as a whole in one state and in other states.—M. C. S.

SYMPOSIUM: ACCIDENTS FROM EXPLOSIVES ON THE WITWATERSRAND MINES. *R. N. Kotzé. Jour. Chem., Metall. and Min. Soc. So. Africa, Aug., 1926, vol. 27, pp. 37–47; Sept., 1926, pp. 56–59.*

Statistics and analyses of accidents for the year 1925 are given in tabular form and compared with those for 1921. The comparison shows an increase, especially in misfire accidents. This increase is due to insufficient care on the part of the miners, who work under high pressure in this region where "the demand for higher and still higher efficiency is insistent." "Employers and managers can assist in an amelioration by so arranging work that miners shall have ample time in which to carry out their duties, and miners by scrupulously fulfilling the requirements of the regulations." A decrease in the number of explosive accidents and the number of deaths therefrom is reported for the first six months of 1926.

In commenting on some of the technical matters brought up in the paper by Dr. Kotzé, one member of the Society stated his belief that the power given out by an explosive is proportional to the detonating force setting it off and therefore "the better or stronger the detonation the less chances there will be of unexploded cartridges remaining behind in sockets."

Another member pointed out that "the Leyner drills and jackhammers are probably contributing causes to accidents" and that with the old Ingersoll or Holman drills, which were larger in diameter, "it was much easier to detect the misfire and the cut-off than it is in these days of drills of smaller diameter." The chief causes of the increase in accidents from drilling into misfires and cut-offs, and blasting accidents generally are:

1. Decrease in size of drills and consequent smaller holes.
2. Insufficient or careless examination of working faces.
3. Inefficient cleaning out of the broken ground.
4. Haste and hurry to get the drills working.
5. Insufficient and, in cases, inefficient supervision; the developing shift boss having more ground to cover than he should

have. A log should be kept for each developing end, in which should be recorded the time when the shift boss visited the working face, and his opinion of its condition.

6. Haste and hurry in charging up, thus giving inefficient blasting.

7. The use of detonators of less capacity than No. 8.

8. The personal factor always. The staff of mine inspectors and sub-inspectors is not adequate—double it.

—M. G. P.

ACCIDENTS IN INDUSTRY. *A. Stephenson. Jour. Nat. Inst. Indust. Psychol., Oct., 1926, vol. 3, pp. 194–200.*

A number of youths, some of whom were novices, while others had already had experience, were subjected to a special course of instruction. Periodic tests of efficiency were given, and, ultimately, those who proved incapable of profiting by instruction were discharged. The accident frequency among all learners was analyzed after the scheme had been in operation for ten months, and it was found that, while the accidents per 1,000 hours of work numbered 1.44 in the forty-five novices who were retained, they numbered 2.03, or 41 per cent. more, in the forty-two novices who were dismissed. Again, they were only 0.88 in the thirty-four experienced learners who were retained, as compared with 3.32 (an excess of 277 per cent.) in the nineteen experienced learners who were dismissed. Since the dismissals were made entirely on a basis of manual tests, it would appear that there is a distinct relationship between manual dexterity and proneness to accident.—H. M. V.

INDUSTRIAL SURGERY

TREATMENT OF INDUSTRIAL DISEASES WITH PHYSIOTHERAPY. *E. C. Duval. Arch. Physical Therapy, X-Ray, Radium, Sept., 1926, vol. 7, pp. 542–547.*

The author describes the treatment in several types of cases which are favorably influenced by physiotherapy: infections, fractures, sprains of the ankle, back strains, synovitis and bursitis, and osteomyelitis.

In infections, the procedure suggested is to cleanse the infected part as well as possible, following this with an exposure to the quartz lamp and then the application of diathermy. This will preclude the possibility of the formation of the mass of adhesions and other sequelae usually attendant upon infections. The sequelae of infectious processes that have prevailed for a considerable period of time are best treated by diathermy, followed by massage and manipulations.

Most cases of ununited fractures and fractures with insufficient callus to form a solid union respond very well to treatment by diathermy, followed by massage in the degree indicated.

In cases of ankle sprain the author suggests the use of hot or cold applications, whichever will make the patient more comfortable, for the first twelve to twenty-four hours, then the application of diathermy, followed by gentle massage. With this treatment there is practically no swelling nor discoloration, there is little, if

any, impairment of the functional movement of the joint, and the period of disability is materially shortened.

For strains of the back muscles four or five treatments are generally sufficient to overcome the condition provided physiotherapy is instituted shortly after the patient is injured.

Diathermy is often effective in cases of synovitis, particularly of the knee joint, when other forms of treatment have failed. Application of diathermy should be followed by the form of massage known as effleurage (stroking the part in the direction of the venous return) to bring about absorption of the extravasated fluid. The patient should then be supplied with an elastic roller bandage to support the tissues and to prevent as far as possible their subsequent infiltration with fluid.

Recent experience with five cases of osteomyelitis leads the author to believe that much can be expected from treatment of this disease with the quartz lamp and diathermy. Although his data on these cases are not yet complete, the author outlines his procedure in the hope that it may offer an incentive for others to work along the same line.—M. C. S.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

EXACT METHODS FOR THE MEASUREMENT OF AIR POLLUTION. *J. B. C. Kershaw. Abstr. as follows from Indust. Chemist, 1926, vol. 2, pp. 153–158, in Chem. Abstr., Nov. 10, 1926, vol. 20, p. 3526.*

Eleven reports have been issued by the Advisory Committee on air pollution (England). Kershaw describes (with illustrations) the kinds of apparatus used in collecting the data contained in these reports (especially soot and dust gages and dust counters), and tabulates the total fall of soluble matter in fifteen towns and cities and the solid constituents of the annual rainfall in nine towns and cities.—P. D.

PRINCIPLES AND METHODS OF HEAT SAVING. *Joint Rep. Nat. Assn. Building Owners and Managers and Nat. District Heating Assn., 1926, pp. 43.*

This report is a compilation of the fundamental principles of economical steam heating and practical suggestions for heat conservation.—C. P. Y.

THE RELATION BETWEEN ILLUMINATION AND EFFICIENCY IN FINE WORK (TYPESETTING BY HAND). *H. C. Weston and A. K. Taylor. Joint Rep. Indust. Fatigue Res. Board and Illumination Res. Com., pp. 12. H. M. Stationery Office, 1926.*

Some measure is given in this report of the extent to which output in the process of typesetting is affected by illumination. Output during daylight is taken as a standard, the daylight illumination being not less than 50 foot candles. The observations were made with artificial illumination below 2 foot candles, about 7 foot candles, and about 14 and 24 foot candles. The "optimum value of illumination" for

hand composing is placed at 20 foot candles. At this illumination a maximum rate of output can be maintained. This standard is adequate for occupational acuity of vision; but this does not mean that it secures maximum physiologic acuity of vision. When the illumination is less than 2 foot candles, about a quarter of the possible output is lost, the number of mistakes is more than doubled, and fatigue is materially increased. At an illumination of 7 foot candles, over 10 per cent. of possible output is lost, and an unnecessarily high percentage of errors occurs. Undue ocular fatigue was not observed with illumination of the order of 10 foot candles; but higher values of illumination are an economic consideration in order to obtain best quantity and quality of output.

In such an industry as printing where night work is not unusual, knowledge regarding the economic value of illumination is of great importance. An illumination today of even 7 foot candles represents a value higher than is generally attained. This report is a good instance of research based on intensive observations carried out over small numbers. It is worth consulting if only to note the methods pursued.—E. L. C.

FACTORIES AND ULTRA-VIOLET RAYS. A NEW GLASS. *Indust. Welfare, Oct., 1926, vol. 8, pp. 333–335.*

The new glass, Vitaglass, was invented by F. E. Lamplough of Birmingham [manufactured by Messrs. Chance Bros. & Co., Ltd., of Smethwick, England, and available in the United States through the Vitaglass Corporation of New York and their agents], and was tested by Dr. J. Bell Ferguson, School Medical Officer of Smethwick, in Crocketts Lane School. Thirty boys aged from 9 to 11 years who occupied a classroom paned with Vitaglass were observed for nine months. The average gain was as follows:

	Weight	*Height*	*Hemoglobin*
	lbs.	*in.*	*%*
Control class...	2.83	1.22	7.53
Vitaglass class..	6.11	1.86	16.14

This article urges the installation of Vitaglass in offices and factories as a means of raising the level of physical health and of increasing the efficiency of industrial populations. Since Vitaglass costs little more than ordinary plate window glass, its installation in industrial establishments as well as in schools and hospitals is practicable.

No transmission data are included in this article, but the commercial agents issue advertising literature showing that, for solar ultraviolet transmission, Vitaglass approaches quartz.—M. G. P.

A NEW ULTRA-VIOLET TRANSMITTING GLASS. *H. P. Hood. Science, Sept. 17, 1926, vol. 64, pp. 281–282.*

"At Corning Glass Works [Corning, N. Y.] there has been developed a new glass, 980 A, transmitting to 200$\mu\mu$ in three mm. thicknesses. Its transmission for wave lengths of 290$\mu\mu$, the extreme limit of the sun's rays through the atmosphere, is 86 per cent. through a two mm. thickness (uncorrected for surface reflections) as measured by the Bureau of Standards. For purposes requiring a full transmission of ultra-violet light from the sun, therefore, this glass is prac-

tically the equal of clear fused quartz."

The cost of the glass is somewhat above that of window glass, but is far below that of quartz.

Several hundred plates of the glass have been manufactured and quantity production in the near future is assured.—M. G. P.

A Physiological Study of the Ventilation and Heating in Certain Factories. *H. M. Vernon, T. Bedford, and C. G. Warner. Indust. Fatigue Res. Board, Rep. No. 35, pp. 84. H. M. Stationery Office, 1926.*

See This Journal, 1927, vol. 9, p. 51.

Use of Air Filters in the New York Public Library. *J. H. Fedeler. Jour. Am. Soc. Heating and Ventil. Eng., Nov., 1926, vol. 32, pp. 749–754.*

On the failure of cheesecloth filters on account of plugging and of air washers on account of their ineffectiveness during the humid summer months, viscous filters of the multiple cell type which eliminated these difficulties were installed. The novel feature of the installation consisted in placing the filters horizontally instead of vertically, thus permitting the filters to be washed with hot water while they are in place. A coat of viscous oil is then applied by spray.

The author states that the innovation reduced the cost of cleaning the filters from $750 to $50 a year. Moreover they have to be cleaned less often in horizontal than in vertical position because the baffles which are placed in front of them catch much of the dust.

In large cities like New York, where the air from the streets is very dirty, the author believes that filtered air is essential for libraries in order to avoid damage to books and documents as well as to the general appointments of the building.—P. D.

The Truth about Window Ventilation. *H. W. Schmidt. Jour. Am. Soc. Heating and Ventil. Eng., Nov., 1926, vol. 32, pp. 755–756.*

This is a short controversial article which adds nothing new.—P. D.

Determination of the Degree of Pollution of the Atmosphere. *d'Arsonval and F. Bordas. Abstr. as follows from Compt. rend. Acad. d. sc., 1926, vol. 182, pp. 823–825, in Chem. Abstr., Nov. 20, 1926, vol. 20, p. 3765.*

A modification of the Owens apparatus has been devised which will be described in a later paper. Its sanitary importance is discussed.—P. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

Worth While to Go into Workers' Homes, Seems General Opinion. *Hosp. Management, Sept., 1926, vol. 22, pp. 64–65.*

Hospital Management wrote to several companies that take an active interest in their employees, asking them their opinions of the various advantages and disadvantages of going into the workers' homes; in all cases

they replied that it is a wise policy. Those companies that do not have their own medical staff have an arrangement with a neighboring hospital, or with an insurance company. The only precautions necessary seem to be a little tact, and a sympathetic feeling for the workmen.

"I believe that . . . . when we receive a dividend in healthy employes, relief of sickness and suffering, it should be enough to satisfy the most critical investor" wrote the assistant manager of one concern.—M. M.

DENTAL SERVICE FOR DEPARTMENT STORE EMPLOYEES. *C. A. Swan and W. D. Thomas. Nation's Health, Nov., 1926, vol. 8, pp. 733–735.*

"Dentistry is chiefly concerned in the general health program by aiding in the prevention of disease, by the removal of physical defects, and by maintaining as high a resistance to invading organisms as possible."

The Halle Bros. Co. of Cleveland considered it a sound business method to offer to its employees good dental work, at the place of employment, for a fee within their ability to pay, believing that healthy, contented employees are the most efficient, and that dental service is a factor in keeping them so.—M. M.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

THE HUMAN SIDE OF INDUSTRIAL WELFARE. *J. R. Clynes. Jour. Roy. San. Inst., Dec., 1926, vol. 47, pp. 423–427.*

Industrial welfare is needed to reduce economic losses due to lost time which, in Great Britain, amounts yearly to three million weeks as the result of rheumatism alone. Benefit accrues from physical recreation, which should be controlled by the workmen themselves if the right spirit is to be attained. Modern factories are a great advance on those of fifty years ago. Medical attendance on the premises is becoming usual, as is also the provision of nurses and messrooms. The suspicion formerly aroused by welfare work is steadily disappearing. As it disappears, employers must move at least as fast as public opinion in establishing better standards for work. The old worker must learn the use of up-to-date appliances. Reduction of compensation payments to injured workmen is worth attention; today about £8,000,000 a year is so spent. Public bodies are in this respect by no means the best employers of labor. Corporation and municipal workmen seldom have any welfare provision made for them; any heap of dirt or tar barrel does to squat upon before a smoky fire in the road at meal times; nor are suitable overalls supplied. Neither earners nor employers can get out of the pool of production and service more than their joint energies put into it. Workmen who want fair treatment must treat their fellows fairly, and learn to give a fair day's work for a fair day's pay.—E. L. C.

THE ECONOMIC VALUE OF WELFARE WORK. *A. Watson. Jour. Roy. San. Inst., Dec., 1926, vol. 47, pp. 429–434.*

Welfare work is necessary to every

progressive business, but it must justify its outlay, or be discontinued. Laws governing business success are finally moral and universal. Welfare should eliminate waste due to human inefficiency measured by ill health and lost time. The author gives account of a welfare organization for which he is responsible. Every employee is medically examined as to physical fitness for his work. All persons under 18 years of age have their teeth inspected quarterly, which removes an important cause of ill health. Meals are provided at cost price at various depots. No one is engaged for more than a short time at repetitive tasks. Rest rooms are provided. Every worker has a history card, on which all information is entered. All promotions are made, so far as possible, within the staff. Instructional lectures are organized. An Appeals Committee considers complaints. Profit sharing is effected by fully paid up life insurance policies, redeemable at a certain age. Insecurity of work should be avoided if possible; for which purpose, in times of rush, overtime should be used, and, in times of slackness, short hours should be worked, by the same staff. Enlargement of the staff by temporary workers in times of rush should not be largely used. Vacancies on the permanent staff should be filled from such temporary workers. The scheme instanced has grown with the industrial establishment, which has steadily prospered from year to year. Much of this prosperity is due to the welfare spirit permeating the whole staff. Material progress is a by-product of general fair play.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Lead Poisoning Bill. *Brit. Med. Jour., Nov. 27, 1926, vol. 2, pp. 1025–1026.*

A discussion in the House of Lords on the Lead Paint (Protection against Poisoning) Bill is reported. Lord Dawson maintained the position that a large part of the proclivity of women to lead poisoning was the result of economic position rather than of sex, and doubted whether in the light of modern knowledge a case existed for excluding women from the painting trade. If the regulations which were to be adopted were good, then there was no case for excluding women. If the regulations were bad, then men as well as women should be excluded—which of course meant that lead should be prohibited in paint. He supported the Bill for introducing regulations, but objected to the exclusion of women from the trade. Lord Haldane also considered that the question whether women were in greater danger from lead poisoning than men was a matter for further inquiry. Lord Desborough represented the more usually accepted medical opinion that females suffer more severely from plumbism than males; and that, while an expectant mother may show no sign of plumbism, her infant may be born dead. In the light of this evidence, he asked

that the Bill should be passed and not shelved for inquiry; and the House agreed.—E. L. C.

PLUMBISM AND ITS AVOIDANCE. *Lancet, Nov. 27, 1926, vol. 2, pp. 1119–1120.*

THE MECHANISM AND INCIDENCE OF INDUSTRIAL LEAD POISONING. *Ibid., pp. 1132–1133.*

Consideration is given to discussion aroused by the Lead Paint (Protection against Poisoning) Bill which is now before Parliament. This Bill proposes to bring house painting under regulations, rather than to prohibit the use of lead in paints. Regulations would prohibit dry rubbing down and the application of lead paint in the form of spray; they would provide for periodic medical examination, and for washing facilities and protective clothing. Whether by these means the risk can be abolished, only experience can tell. If experience teaches the contrary, then abolition of lead in paints, in accordance with the agreement of the Geneva Convention, would be adopted. The risk when measured in dust content amounts to the possibility of inhaling at least 2 mg. of lead daily. Lead in the body is stored as an insoluble phosphate in the skeleton, whence, however, it may be brought by the ingestion of acids back into the blood stream when it produces toxic symptoms.

The Bill follows the Geneva Convention in prohibiting employment of women and children; this point has led to considerable discussion. Evidence regarding the effect of lead on women is brought together in the second of the two articles. The claim that women are more susceptible than men to lead is an old one, but one that does not receive complete assent, and the question is raised as to whether, although the effect of plumbism in causing miscarriage and stillbirth is a sufficient reason for excluding females from exposure to lead dust, there is evidence that they fall victims more readily than men. The argument is perhaps of academic and scientific importance rather than a practical issue. Women in industry stay shorter periods of time, and lead poisoning is a direct function of "green" labor. Women usually in employment are less advantageously placed with regard to wages than men; hence they tend to be not so well nourished, a point which favors succumbing to lead poisoning. Evidence is given that the ill effect on the next generation is possibly as great from a leaded father as from a leaded mother. Consideration of the whole question lends more and more support to the view that abolition of exposure to lead risk should, if possible, be insisted upon by legislation. The result of the new proposals when they become law must be watched with interest. They set up a system of inspection which must carry the state into the home, which has previously escaped from such interference.—E. L. C.

WORKMEN'S COMPENSATION LEGISLATION OF THE UNITED STATES AND CANADA AS OF JULY 1, 1926. *U. S. Bur. Labor Statistics, Bull. No. 423, Dec., 1926, pp. 687.*

The main provisions of the laws are presented by the aid of comparable statements in tables and charts.

REHABILITATION OF DISABLED EMPLOYEES

SOME OF THE PRINCIPLES UNDERLYING VILLAGE SETTLEMENTS FOR THE CONSUMPTIVE. *P. C. Varrier-Jones. Abstr. as follows from Brit. Jour. Tuberc., Jan., 1926, vol. 20, pp. 11–19, in Bull. Hyg., Oct., 1926, vol. 1, p. 783.*

In this short paper the writer lays down some of the fundamental principles underlying the scheme of village settlements for the consumptive, and in doing so expresses his belief that the village settlement has come to stay and has now ceased to be purely an experiment. The first principle is that the tuberculous patient must live in an environment best suited to his condition. Although this is an obvious ideal it is by no means easy to achieve in actual practice, and Dr. Varrier-Jones shows how the victim of tuberculosis becomes the victim of fierce competition in his own walk of life and is frequently pushed aside in the struggle. Consequently, the patient in a village settlement is able to realize that the environment is his home with all its associations, that it is a community to work for and not an institution to which he has been sent. Furthermore, he has a sense of security which he has not had in the economic struggle hitherto. The writer insists also that the head of a workshop in a village settlement (foreman or manager in charge of the work) should be an ex-patient. Such a man has an entirely different outlook from a healthy person. For the latter, the village settlement is only one of many ways of earning a living; he is a paid servant of the institution, here today and gone tomorrow, and has no difficulty in finding a job in the outside world. The ex-patient regards the settlement as his home and the work there as his life work.

Finally, a sheltered existence for a tuberculous patient cannot be manufactured in a village settlement with a stroke of the pen. Such an existence must be of slow growth, and the laborer, carpenter, the printer and leather worker and a host of others can only be fitted into the settlement scheme by a process of gradual development. Dr. Varrier-Jones believes that the answer to the critics is to be found in the steady growth of Papworth.

WORKSHOPS FOR THE TUBERCULOUS. *N. D. Bardswell. Abstr. as follows from Brit. Jour. Tuberc., Jan., 1926, vol. 20, p. 25, in Am. Rev. Tuberc., Nov. 1926, vol. 14, p. 147.*

No proposed solution of the tuberculosis problem can afford to ignore economic and industrial factors. Bardswell attempts to describe the work developed at the Spero Leather Factory in Hatton Garden, Holborn, London. All of its workers have been sufferers from pulmonary tuberculosis. The following summary is made from an experience of three years: (1) The organization of employment for tuberculous persons is a practical proposition. Their training for a skilled trade, however, is not generally possible. The trade chosen should not be a skilled one, but rather one demanding the minimum of training in which the output of the workers can be assisted by the use of simple machinery. (2) Medically speaking, tuberculous persons working in a city factory, under conditions such as can be seen in this

workshop, do very well. As a means of after-care, the success of the factory is fully proved. (3) A factory for tuberculous persons wants a certain and constant market for its products. (4) The factory must be subsidized.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

Occupation and Mortality. *Japan Letter, Jour. Am. Med. Assn., Oct. 23, 1926, vol. 87, p. 1406.*

According to the mortality statistics of various occupations in Japan, the tuberculosis death rate in 1924 was nineteen per ten thousand. The mortality of female workers in textile manufacturing was the highest of all, and next in order that of telephone girls and female clerks in the mail service. Among the dead of infectious diseases, the number of female servants was the largest, and next in order that of female machinery workers or telephone girls and female clerks in the mail service. The incidence was lowest among farmers and quarrymen. Cerebral hemorrhage and senile dementia raised the mortality rate of old male farmers, and next in order male merchants and hotel employees. Death from accident was most frequent among miners and next in order among male gas and electrical workers.

Nonoccupational Diseases and Injuries of Workers. *Japan Letter, Jour. Am. Med. Assn., Oct. 23, 1926, vol. 87, p. 1406.*

Dr. B. Koimuna, medical expert in the society bureau of the home department, has published investigations on nonoccupational diseases and injuries of workers. In 471 factories employing 500 or more workers, 162,927 persons lost from work three or more days in a year because of nonoccupational diseases. Male cases of nonoccupational diseases were 179 per thousand workers, and the incidence was about double among female workers. The death rate was 4.3 per thousand, and 18.4 persons per thousand were discharged because of insurable diseases. Most of the tuberculosis occurred among textile workers, and next in order were workers in founding, printing, and binding. According to the investigations of 8,608 male and 6,826 female workers in eleven factories (three cotton mills, three engine shops, three ship and car workshops, a wire workshop, and a fertilizer factory) in Tokyo Prefecture, twenty-five cases out of 930 injuries were from nonoccupational causes.

Loss of Time among Workingmen. *Netherlands Letter, Jour. Am. Med. Assn., Nov. 27, 1926, vol. 87, p. 1844.*

A statistical study just published covering the years 1923, 1924, and 1925, gives the average number of days of sickness experienced by workmen in various industries. Miners lose the most time on account of sickness. The figures below give the averages for the three-year period:

	das.
Woodworking industry	7.43
Tailors	5.19
Farmers	6.16
Metallurgists	7.17
Miners	17.03
Painters	5.87
Shoemakers	5.96
Weavers	7.86

—K. R. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

FIFTH ANNUAL REPORT OF THE SECRETARY FOR MINES FOR THE YEAR 1925. *H. M. Stationery Office, 1926.*

This report appears just twelve months after completion of the year discussed. For the most part it deals with wage questions, colliery development, and legislation in coal and metalliferous mining; but allusion is made to certain matters of more direct interest to health. Pithead bath accommodation slightly increased, but still existed for only some 20,000 miners, out of 1,000,000 working underground; even so, the accommodation was double that for 1924. It is to be greatly increased in the near future out of welfare moneys.

Reference is also made to other activities financed by the Miners' Welfare Fund, more especially with regard to safety research. Fewer persons were killed or injured during the year, both actually and per man shift worked. About 40 per cent. of all accidents were, as usual, due to falls of ground, often as a result of indifferent timbering. A proportion of accidents of all sorts arose from sheer foolishness, due to lack of discipline. More light is, perhaps, the greatest single contribution that could be made to safety,

health, and efficiency underground; more light is being got by substituting 20 for 28 mesh gauzes on flame safety lamps and by lamps of new design; and by improved electric lamps of which the cap lamp and pillarless lamp are instances. First aid and ambulance provision was investigated and was found below reasonable requirements. Increased use of jackhammer drills for driving roads in silica rock has been found to be subjecting men to grave risk from silicosis; but simultaneously a dust catching device is announced.

The report contains a wealth of information condensed into tables and useful diagrams, which are left to the reader to analyze. Thus, there were 3,444 new cases of nystagmus, or 173 more than in 1924; 1,122 new cases of beat hand, or 62 more than in 1924; and 2,593 of beat knee, a reduction of 253. Death rates from all kinds of accidental causes, except haulage, are shown to have steadily fallen since 1875, especially those from explosions and shaft accidents. The mean annual accidental death rate per thousand employed, 1913 to 1922, was 1.2, compared with 1 for France, 1.2 for Belgium, 2.8 for Germany, and 4.3 for the United States.—E. L. C.

Sixth Annual Report of the Industrial Fatigue Research Board to 31st December, 1925 (Including Analysis of Published Work). *H. M. Stationery Office, 1926, pp. 126. Abstr. as follows in Bull. Hyg., Dec., 1926, vol. 1, pp. 983–984.*

Readers of the latest annual report of the Industrial Fatigue Research Board must conclude that the word fatigue, in its usual acceptation, by no means covers the field under investigation; "human activity" more nearly represents its scope. The report first sets out the organization and methods used, and the general and specific problems under attention either in industrial practice or in the more precise environment of the laboratory. The scope of the work continues to enlarge, but the Board contemplate the future with confidence, holding that they represent a movement of limitless possibilities of benefit to wage payers and wage earners in which industries must participate ever more and more. The main interest, however, must center on the excellent analysis given of work already published; it fits together into an understandable picture the numerous reports of the Board, each of which when viewed alone may have seemed rather like an isolated piece of a jig saw puzzle.

The width of the sociologic and economic factors concerned is skilfully portrayed. Fatigue is too elusive and negative a term to permit of direct measurement; indirect tests have, therefore, been employed. Variation in output has been extensively used in relation to changes in hours, conditions of employment, and methods of work; similarly sickness and mortality rates, labor turnover, lost time, and the occurrence of accidents have been used to estimate the strain thrown on the human machine. And it is found reacting, when measured by output, in the same way from hour to hour, and from day to day, in such diverse industries as steel smelting; weaving cotton, silk, or linen; making shoes; folding or ironing handkerchiefs; and tending stamping presses. By such means are underlying principles being determined.

J. I. H.
July, 1927

Evidence is quoted bearing on the most advantageous length of working day and week, the best length of shift, and the use of rest pauses. The influence of atmospheric conditions has been closely studied, and is found to be of first importance to both health and output; in this regard temperature and humidity are the ruling factors, which together make up the cooling power of air. The movements of the workers and the clothes worn affect the position. Gradually rules for optimum conditions are emerging, and are found to be identical for fewest accidents and greatest output.

Lighting has been investigated and shown to be a powerful factor, too often much neglected; adequate illumination increases the quality and quantity of work, diminishes eyestrain and adds to contentment. The best ways of fitting the worker to his work, physically and mentally, and of fitting the work for the workers, provide a widening field for research, calling for vocational training and selection, skilled machine designing and the invention of labor saving devices. Movement and time study at a number of operations have disclosed the great need for teaching how work should be done to save unnecessary expenditure of energy, for organization of team work and of efficient routing of material. Here the value of rhythm to production and to the postponement of fatigue is considerable. Methods of carrying loads and the weights to carry have been studied, and also the advantage of working sometimes sitting, sometimes standing. Throughout the analysis each subject introduced is exemplified by evidence drawn from the reports of the Board, instances are given, figures are quoted, and illustrations reproduced. No one can read it without being struck by the amount of ground already tilled in this newly discovered country in the world of public health, a country in which expenditure on health gives immediate and bountiful returns.

[We would add a word of thanks to Mr. D. R. Wilson, secretary to the Board, for this admirable résumé of the activities he has done so much to organize.]

THE POTTERY TRADE AS A HOME INDUSTRY IN THE COMMUNITY OF LUZGARINO, DISTRICT OF JEGORJEWSK, MOSCOW. *N. Tolerow and W. Iwanowsky. Gigiena Truda, 1926, no. 2, pp. 43–51.*

In the district of Jegorjewsk, Moscow, four villages have, since olden times, been engaged in the manufacture of pottery. There is good pottery clay nearby and it is obtained in the most primitive manner at a depth of 5.7 to 7.2 meters. There are engaged in this home industry 101 peasant families who constitute 10.7 per cent. of the total population of these villages. The clay is procured chiefly in winter because in summer frequent landslides occur, owing to the abundance of water. Further work consists of mixing the clay with water, forming the vessel on a potter's wheel operated either by hand or by foot, drying the prepared vessel, covering it with a glaze, and firing it in the kiln.

Injurious factors in this industry are: great muscle strain in extracting and mixing the clay, as well as in the work at the potter's wheel. In operating the wheel by foot, the right foot especially becomes strained owing to

the unnatural bending of the torso. One result of this is the frequently occurring hypertrophy of the muscle groups of the right leg, and the curvature of the spine (posterior and lateral). The work is performed under unfavorable conditions: at a low temperature in the open air in winter, and at a high temperature with much moisture in the air when drying the moist vessels in the living room or in the workshop.

Most injurious, however, is the lead, to the fumes of which the potter is exposed from the beginning of the preparation of the glaze until it is applied to the vessel. This entire process (the so-called "dry" glazing method) brings about the development of considerable lead dust. The "wet" method, owing to the materials and the time required, is little used.

The members of the potter's family are also subjected to the injurious effects of the lead fumes, since 75 per cent. of the "workshops" are in the living rooms. The shed, in which is the kiln for firing the pottery, is usually dark, extremely smoky, and half ruined.

The health condition of twenty-four potters was investigated, of whom seventeen had been engaged at their trade for from eleven to fifteen years. Only four of those examined showed no signs of lead poisoning; one of these had given up the potter's trade a long time before and was a carpenter at the time, two had only recently begun work as potters, and one worked exclusively at the wet method.—A. W. N.

HEALTH CONDITIONS IN THE STONE GRINDING WORKS OF SSWERDLOWSK (URAL). *M. Wilensky. Gigiena Truda, 1926, no. 2, pp. 52–59.*

This grinding establishment is engaged in working colored, hard kinds of stone and in cutting precious and semiprecious stones, as well as in manufacturing agate prisms. It can look back upon an existence of about 100 years, and has still partially preserved the character of a home industry.

The principal injurious factors of the trade are: the development of dust from lead, tin, chromic oxide, infusorial earth, and mineral silicates; the strain on the vision and the attention; the shaking of the workbenches; and the shrill noise of the grinding. The general hygienic situation is unfavorable.

Sixty-seven workers at different occupations were subjected to a medical examination. The excessive dissemination of tuberculosis, especially of a fibrous productive nature, was remarkable; the presence of pneumonokoniotic and pneumosclerotic changes in the lungs was characteristic; in a large number of the workers the power of vision was reduced; there were numerous cases of neurasthenia and of disturbances of the circulatory organs.

A number of regulations are suggested for the purpose of making the work sanitary.—A. W. N.

FACTORY INSPECTION IN JAPAN IN 1924. *Internat. Labour Rev., Dec., 1926, vol. 14, pp. 872–876.*

Japan has been late to join the industrial countries; her first Factory Act dates from 1911. Already a large staff of inspectors exists, numbering 245. In 1924 there were 27,073 fac-

tories, of which 19,200 employed 15 persons or more. The textile industry counts for the lion's share of factories and of those employed. This explains the fact that in the larger factories there are more women than men employed. The total number of workers under the Factory Act for the year was 1,491,303. Employment of children under 12 years of age has been nearly abolished, and only a small number of children between the ages 12 and 14 are employed. Although the hours of employment in other factories amounted to between nine and ten hours a day, in the textile industries a twelve-hour day was general, and work was carried out on the two shift system by day and by night in a large number. Two holidays a month are usually given, in connection with which the absence of Sunday as a rest day must be observed.

Considerable attention is being paid to matters of hygiene by the inspectors, who report that new factories are generally well equipped, and that the dormitories, required for workers imported from a distance, are generally hygienic. Special attention was paid during the year to prevention of industrial diseases, tuberculosis, trachoma, and other infectious complaints. Research was also made into the dental condition of confectionery workers; maternity; measures for reducing temperature in the summer months; and the occurrence of parasitic diseases among workers in silk filatures.—E. L. C.

INDUSTRIAL CONDITIONS AND LABOUR LEGISLATION IN JAPAN. *I. F. Ayusawa. Internat. Labour Office, Studies and Rep., Series B (Economic Conditions) No. 16, 1926, pp. 119. Abstr. as follows in Bull. Hyg., Dec., 1926, vol. 1, pp. 981–982.*

An interesting picture is given in this volume of the industrial development of Japan. The total population of the Islands was nearly 60,000,000 in 1925. In 1920, when the population was just under 56,000,000, the working population amounted to 16,000,000, of whom 9,000,000 were employed in agriculture, and 4,000,000 in industry including mining. Of those employed in factories and workshops, there were 800,637 in 1909 and in 1922 1,691,019. The number of factories employing over 1,000 workers is steadily increasing, although there are still a very large number of small industrial concerns.

The number employed in mining in 1922 was 300,000, of which 76,000 were women. The world war had an important influence in giving a sudden impetus to the development of Japanese industries. Since the war this impetus has slackened and the effect is to be seen both in factory unemployment and in mining. Thus in 1919 there were employed in mining 465,156 persons, of whom 111,849 were women. Labor legislation is practically a matter of this century in Japan; but it remains a good deal behind the standard adopted in European industrial countries and that adopted at Washington. Nevertheless, steps are being taken to advance the standard of industrial legislation. Working hours remain long. Very few factories work eight hours or less, while twelve hours or more are worked in over 4 per cent. of the places. Much remains to be done in the way of establishing daily rest periods for meals

and also rest days per month in a country where there is no observance of a seventh day of rest. Wages appear still to be low, but they have improved in real value in recent years; by 1919 prices had risen faster than wages, which led to widespread social unrest and "rice riots." Today wages are three times higher than in 1914, while prices are slightly more than twice as high. Although studies of the human factor are being conducted in Japan, the results obtained do not appear as yet to have been carried into industrial practice; there is little indication of medical supervision, and no signs of investigations into industrial diseases. An Act abolishing the use of white phosphorus has been adopted, but no information is given as to what was taking place in the factories before. Those interested in the industrial expansion of Japan will find useful information in this volume.

RELATION BETWEEN HEALTH SUPERVISION IN SCHOOLS AND INDUSTRIES. *C. O. Sappington. Am. Jour. Pub. Health, June, 1926, vol. 16, pp. 594–596.*

Dr. Sappington believes that, if different groups of children could be examined while in school and the records preserved and compared with an examination made later in an industrial establishment, we would have a fair estimate of the efficiency of health work in schools. Consummation of this plan would involve:

1. The use of standardized record forms and a manual of examination procedure.
2. The adoption of a rating scale applicable to physical defects.
3. Use of records and rating scale upon the same individuals, comparing physical status in school and in industry.
4. A study of the relation of physical defects to absenteeism both in schools and industries.
5. The institution of an efficient follow-up system for the correction of defects.

In this way the basis for industrial health work may be largely grounded in school health supervision and the human product improved in the direct ratio in which school health work becomes more efficient. The author believes that gradually industry would become more than casually interested in the raising of standards of school health, and that there might come a day when the larger industries would contribute in a material way to the advancement of health work in schools, thus developing a real program of preventive medicine in industry.—M. C. S.

THE HEALTH OF THE TEACHER. *J. F. Rogers. Abstr. as follows from U. S. Bur. Education, School Health Studies No. 12, 1926, in Am. Jour. Pub. Health, March, 1927, vol. 17, p. 289.*

This is a very instructive bulletin of sixty-four pages including a twenty-page table showing the faculty and student health supervision in teacher training institutions in the various states of the Union, also institutions having teacher health supervision. The subject in the body of the report is taken up under the headings of: Are teachers healthy? Responsibility of the training school, of the local board, of supervisors, of the community, and of the teacher. State requirements and what is done by cities, and the health in teacher

training institutions are considered. "School authorities are wise in granting sick leave with pay for at least 10 days a year in order that the teacher, whose salary is never too large, may not feel it incumbent upon her to remain in school when actually unfit for duty. Springfield and Cleveland allow 10 days' sick leave with full pay; and Denver gives 5 days a year, which is cumulative over a period of 12 years. The statistics given elsewhere would seem to indicate that the privilege is not abused."

SOME ASPECTS OF INDUSTRIAL MEDICAL PRACTICE. *C. H. Watson. Nation's Health, Dec., 1926, vol. 8, pp. 817–818, 866.*

Medical endeavors in industry began as an attempt to find the answer to surgical problems arising out of and in the course of employment; now, however, three important activities can be classified under it: emergency sickness cases; counsel and advice in sickness problems; and diagnostic service. The average patient suffering from chronic ailments, yet able to continue work, is not going to spend much money on the doctor; in such a case the industrial physician may be able to suggest some remedy or point out the necessity of a doctor's care.

There are three types of patients: the individual who appears for treatment semioccasionally; the habitual visitor to the medical department for all kinds of ailments; the neurasthenic who resorts to the department for every ache and pain. Provision for such medical treatment gives the management an opportunity of allocating its workers somewhat according to their response to their ills.

The average employee, of necessity, resorts to the average doctor, who does not have, and cannot afford to have, the equipment for making unusual examinations and tests. Industry, in providing diagnostic opportunity for the physician, makes him take more interest and develop more confidence.—M. M.

OCCUPATION AND HEALTH. BROCHURES No. 58–63. *Internat. Labour Office, 1926.*

The subjects contained are: Miners' Nystagmus; Industrial Waste Water (Treatment of); Postal, Telegraphic and Telephonic Services; Trinitrotoluene, Trinitroxylene, Trioxybenzene; Tuberculosis—Silicosis; Aluminium, Amber.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

EXPERIMENTAL CONTRIBUTION TO THE KNOWLEDGE OF THE CARCINOGENIC SUBSTANCE IN COAL TAR. *L. Nieuwejaar. Abstr. as follows from Med. Rev., Bergen, 1925, p. 575, in München. med. Wchnschr., Nov. 19, 1926, vol. 73, p. 1999.*

Experiments were carried out on white mice with two distillation products of coal tar. On one series (79 mice) material distilling over at 350° to 400° was used, and on another series (66 mice) material distilling over at 270° to 350°. Of the first series of 79 mice, 34 lived more than ninety days and of this number 30 showed tumors

which in 19 cases were malignant pavement celled epithelioma. Of the second series, 29 mice lived more than ninety days, 12 showed benign warts but none showed malignant tumors. It should be noted that the material with a low boiling point had a greater toxic effect on the mice than did that with a high boiling point.

DOES ARSENIC PLAY A PART IN TAR CANCERIZATION IN MICE? *A. de Coulon. Abstr. as follows from Compt. rend. Soc. de biol., 1925, vol. 93, pp. 1369–1371, in Bull. Hyg., Sept., 1926, vol. 1, p. 684.*

The author painted five series of forty mice each with tars of which the arsenic content had been estimated. The results showed that a tar containing twice as much arsenic as the others had no carcinogenic action.

Tar	*Percentage of Arsenic*	*Percentage of Mice Bearing Cancers after 210 Days*
Gas works, Paris....	0.00031	53
Gas works, Strasbourg.....	0.00040	40
Gas works, Zurich..	0.00034	95
Gas works, Lausanne.....	0.00036	69
Low temperature vacuum tar.....	0.00080	0

[This is an experimental contribution to a question upon which there has been a great deal of imaginative writing, and assertion based upon selected evidence.]

ARSENIC IN RELATION TO CANCER. *A. H. Roffo and L. M. Correa. Abstr. as follows from Bol. d. Inst. de Med. Exper. Buenos Aires, March, 1926, vol. 2, p. 367, in Jour. Am. Med. Assn., Nov. 6, 1926, vol. 87, p. 1596.*

Roffo and Correa found no more than the normal traces of arsenic in the tissues of tar-painted animals that had developed cancer, and when they treated animals with arsenic over long periods of time, none of them developed cancer. Other arguments against a connection of arsenic with cancer are the fact that cancer could be induced with tar that contained less than a tenth of the arsenic content of foreign tars, and also that in the Córdoba district, where the drinking water contains arsenic and chronic arsenism is common, cancer is not exceptionally prevalent.

ARTERIOSCLEROSIS AND CIRRHOSIS AS OCCUPATIONAL INJURY. *v. Schnizer. Med. Klin., April 9, 1926, vol. 22, p. 581.*

PREVENTION AND TREATMENT OF RHEUMATISM IN INDUSTRY. A DISCUSSION. *Health, London, Jan., 1927, vol. 6, pp. 12–18.*

The part played in the causation of rheumatism by local infected foci in the tonsils, teeth, appendix, or gall-bladder, was stressed by Sir T. Horder, who also held that nutrition and exposure to cold and damp were of great import; he summarized causation under infection, poor nutrition, and bad environment. Dr. H. Mummery expanded the issue, quoting published records showing that 50 per cent. of patients with acute rheumatism had faulty tonsils, and 75 per cent. of all patients with rheumatism had septic teeth. He expressed the opinions that medical examination on engagement was a necessity from the employers' viewpoint of compensation risk; and that dental treatment at the factory paid its own way by lessening lost

time, as did also high frequency electric treatment, which cost only about £8 for apparatus and the salary of a masseuse. He considered that the rheumatic joint called rather for combined action on the part of neighboring factories, and for an industrial rheumatic clinic in every great industrial town. Lay members of industrial concerns present supported the two medical speakers and decided to follow up the points raised.—E. L. C.

RESPIRATORY SYSTEM

COMBATING UPPER RESPIRATORY TRACT INFECTIONS WITH COLD VACCINE. *J. E. Rush. Nation's Health, Feb., 1927, vol. 9, pp. 18–20, 80.*

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

NEWS ON INDUSTRIAL POISONINGS. *E. Brezina. Abstr. as follows from Oesterr. Chem.-Ztg., 1926, vol. 29, pp. 142–143, in Chem. Abstr., Jan. 10, 1927, vol. 21, p. 143.*

The symptoms of lead poisoning, acute and chronic benzene poisoning, and the diseases originating from the contact with crude oil and coal tar are described. The inhalation of lead dust or vapors forms the chief danger in lead poisoning. A chronic benzene poisoning necessitates immediate suspension of work, as on a later stage the blood forming organs will be irreparably injured and cause death. The diseases originating from crude oil, coal tar, and the products obtained from these occur several months after the contact as inflammation of the skin, which finally, after several years, will be cancerous. Except for the cancer of the bladder occurring in aniline workers, such cancerous formations are in general not considered malignant, when the operative removal is not delayed. The origin of this disease is discussed.—P. D.

THE DETECTION AND DETERMINATION OF SMALL QUANTITIES OF ARSENIC IN GASES. *G. Lockemann. Abstr. as follows from Ztschr. f. angew. Chem., 1926, vol. 39, pp. 1125–1127, in Chem. Abstr., Jan. 10, 1927, vol. 21, p. 36.*

Absorption charcoal, such as is used in gas masks, is an excellent absorbing agent for arsine in hydrogen gas. It is probable that the charcoal absorbs elementary arsenic, however, rather than undecomposed arsine. To remove the arsenic, it is merely necessary to digest the charcoal successively with hot, normal sodium hydroxide and hot, normal sulphuric acid. Then by adding ferric alum and a little ammonium hydroxide, the arsenic is precipitated as ferric salt from which all arsenic can be recovered in the Marsh apparatus. Hydrogen gas can be freed from arsine by washing the gas with 6 per cent. potassium permanganate and then passing it through a charcoal tower. Most sodium hydroxide samples contain a little arsenic but that made from the action of

sodium upon water is free from arsenic. It is interesting to note that arsine can be removed from illuminating gas by bubbling it through bromine but fuming nitric acid and charcoal are both very inefficient absorbers of arsine from illuminating gas. The illuminating gas of Berlin contains about 170 mg. of arsenic in 1 cubic meter.—P. D.

Carbon Disulphide Poisoning. *M. Arezzi. Abstr. as follows from Policlinico, Rome, July 1, 1926, vol. 33, Med. Section, p. 362, in Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, p. 1075.*

Arezzi made an experimental study of poisoning with carbon disulphide in animals. In human subjects the symptoms are cerebral, hysterical, and nervous. The first resemble an intoxication and the last constitute usually a paresis. Paralysis of accommodation indicates a grave chronic poisoning. The number of erythrocytes decreases, the leukocytes increase.

Medicine and Law. *H. Zangger. Abstr. as follows from Schweiz. med. Wchnschr., July 17, 1926, vol. 56, p. 687, in Jour. Am. Med. Assn., Oct. 2, 1926, vol. 87, p. 1161.*

Zangger deals with volatile poisons, especially carbon monoxide (garage poison) and alcohol. Absence of the former in the blood does not prove anything, if the poisoned subject had been breathing artificially, if the necropsy was made after several days, if the blood had been transported in contact with air, or if the sensitiveness of the apparatus had not been determined. Many avoidable errors are made in forensic cases. The determination of alcohol has many sources of error and a wrong positive result may damage greatly the family of the deceased. Two methods different in principle should always be used. He believes that the use of tetraethyl lead in gasoline is dangerous and approves of its prohibition in Switzerland. He finds that the American experiments on its dangers were discontinued before the latter could be demonstrated. Innocuous substitutes, such as alcohol, may afford its technical advantages without entailing its dangers.

Carbon Monoxide Poisoning: Mental and Neurologic Changes. *M. C. Borman. Abstr. as follows from Am. Jour. Psychiat., July, 1926, vol. 6, p. 135, in Jour. Am. Med. Assn., Nov. 20, 1926, vol. 87, p. 1769.*

A case of accidental carbon monoxide poisoning is reported by Borman in which the patient showed evidence of widespread central nervous system changes from which there was apparent recovery, followed again by numerous mental and neurologic disturbances with ultimate recovery except for the mental state. The chemical alterations in the blood and the clinical tests thereof in carbon monoxide poisoning are mentioned. The anatomic changes in the central nervous system following carbon monoxide poisoning are discussed together with the various explanations offered for their occurrence.—K. R. D.

Garage Accidents. *J. Dettling. Abstr. as follows from Schweiz. med. Wchnschr., Aug. 28, 1926, vol. 56, p. 832, in Jour. Am. Med. Assn., Nov. 20, 1926, vol. 87, p. 1779.*

Dettling points out that the exhaust gas contains 2, 8, or 14 per cent. of carbon monoxide. Nobody would stay in a room with an open gas jet, although illuminating gas contains about the same percentage (5 to 12 per cent.) of the substance. He reports a case of garage poisoning where the circumstance (unusual closing of inner door) led to suspicion of intended suicide.—K. R. D.

DIAGNOSIS OF CARBON-MONOXIDE POISONING. HISTORICAL RECORDS OF POISONING BY CARBON-MONOXIDE. *W. P. Yant. Safety Engin., Sept., 1926, vol. 52, pp. 110–115.*

A historical sketch of carbon monoxide poisoning from ancient Greek times is here given, with a review of the early methods of diagnosis. Errors in diagnosis and positive indications of carbon monoxide poisoning are discussed. A description of the United States Bureau of Mines apparatus for testing for carbon monoxide poisoning and the technic for determining carbon monoxide in blood and in air are given, followed by a discussion of the value of the apparatus in domestic and industrial life.—R. M. T.

THE USE OF EXPLOSIVES UNDERGROUND AS GIVING RISE TO CARBON MONOXIDE AND OXIDES OF NITROGEN POISONING. *G. H. Gehrmann and W. H. Ward. Abstr. as follows from Du Pont Explosives Ser. Bull., Oct., 1926, pp. 3, in Chem. Abstr., Jan. 20, 1927, vol. 21, p. 323.*

Although explosives are compounded with a view to the production of the minimum amount of poisonous gases in their explosion products when they are properly fired, yet if the charges are not properly confined, or weak detonators are used, or the explosive has deteriorated in improper storage, excessive quantities of noxious gases are evolved. When such explosives burn, nitrogen oxides are evolved. Ventilation is urged. The symptoms of poisoning by carbon monoxide and by nitrogen oxides are described and "first-aid" and "after" treatments set forth. Gelatin dynamites with No. 6 or stronger detonators are recommended for use underground.—P. D.

SODIUM THIOSULPHATE AND CALCIUM SALTS IN PREVENTION OF THE SEQUELAE OF ILLUMINATING GAS POISONING. *W. H. Zeigler. Jour. Lab. and Clin. Med., Nov., 1926, vol. 12, pp. 109–114.*

The author carried out a series of experiments on dogs with 2 per cent. city illuminating gas. In one experiment gas was given until gasping, convulsions, or cessation of breathing was produced; in each case the dog died before treatment could be given. In another set of experiments in which the dogs were gassed to the same degree, and artificial respiration was administered, good results were obtained by injecting intravenously 5 c.c. of a 2 per cent. solution of sodium thiosulphate per kilo, and by injecting subcutaneously at the same time 2 c.c. of a 1 per cent. solution of calcium chloride per kilo. In this series, of fourteen dogs all recovered although one died later, on the eighteenth day.

The author concludes that: (1) It is possible to produce in dogs the sequelae of carbon monoxide poisoning such as mental disturbances, general weakness, skin eruptions, etc. (2)

It is possible to prevent these symptoms by the intravenous injection of sodium thiosulphate and the subcutaneous injection of calcium salts.—E. O.

NOXIOUS GASES AND TEMPERATURE CONDITIONS IN A HYDROGEN PLANT. *M. Bensmann. Gigiena Truda, 1926, no. 4, pp. 52–58.*

The author tested the air for carbon dioxide, carbon monoxide, hydrogen sulphide, and sulphur dioxide and took temperature readings in the principal sections of the factory. His object was to find the extent to which the presence of these gases in the air, in association with high temperature, influenced the health of the workers. The results are as follows:

	Per Cent.	*Maximum in*
CO_2.....	0.036	generator section during hot blasts.
CO.....0.0058–0.0224		hydrogen section
SO_2.....0.0070–0.0250		regenerator section.
H_2S.....0.0040–0.0330		gas ventilator section.

The temperature in many sections was as high as 48°C. No case of heat stroke was reported, however. Some workers complained of feeling of warmth and weakness and many complained of headache and eyestrain. There were no serious symptoms of gas poisoning or of heat regulation disorders.—C. P. Y.

HYDROGEN SULPHIDE POISONING IN THE TEXAS PANHANDLE, BIG LAKE, TEXAS, AND MCCAMEY, TEXAS, OIL FIELDS. *W. P. Yant and H. C. Fowler. Abstr. as follows from U. S. Bur. Mines, Rep. Investigations, Serial No. 2776, Oct., 1926, pp. 20, in Chem. Abstr., Jan. 10, 1927, vol. 21, p. 170.*

The work undertaken in each field included: (1) examination of the gas coming from representative wells, and analysis of gas-air mixtures to which workmen were or might be exposed; (2) observation of symptoms of poisoning and their severity; (3) observation of the conditions of exposure that produced the symptoms; and (4) study of ways and means of protection and prevention. The source of the hazard, drilling practice in the different fields, study of hydrogen sulphide concentrations and the occurrence and type of symptoms are discussed. Treatment, precautions, and protective measures are included in the discussion.—P. D.

SEVERAL CASES OF INDUSTRIAL POISONING IN THE MANUFACTURE OF CODEINE. *S. Goldberg and R. Leitis. Gigiena Truda, 1926, no. 2, pp. 60–64.*

The new process of producing codeine by methylating the chloride has injurious effects. The authors had the opportunity of observing several rather serious cases of poisoning in a large pharmaceutic factory. The investigation of the health conditions in the factory and the clinical examination of these cases, as well as several experiments on rabbits, have led the authors to the conclusion that the cause of these general and local manifestations of industrial poisoning was the methyl ether of the paratoluolsulphochloride. The authors consider it necessary to record this substance in the official list of industrial poisons. At the same time they recommend that the apparatus for the manufacture of this substance be isolated and that the process

of production be generally mechanized.—A. W. N.

DISCUSSION OF CERTAIN PHASES OF THE LEAD QUESTION. *Böttrich. Zentralbl. f. Gewerbehyg., March, 1926, N. S. vol. 3, pp. 57–60.*

This is chiefly a discussion of prophylaxis and of diagnostic problems in cases of lead poisoning.

CONTRIBUTION TO THE DIAGNOSIS OF LEAD POISONING. *Stickl. München. med. Wchnschr., July 23, 1926, vol. 73, p. 1255.*

The author reports the results of an examination of the total working force of two lead works in Baden (ninety-six workers). Statements of the patients showed that a rather severe or lasting illness within the last two years previous to entrance into the lead work caused a greater susceptibility to lead. The present unfavorable living conditions of the workers are to be considered in judging the significance of the color of the skin, state of nutrition, condition of strength, and digestive disturbances. The diagnostic value of stippled red cells should not be overestimated. The white blood picture was thoroughly examined and its diagnostic significance studied.—M. C. S.

EXAMINATION OF MEN WORKING IN PRINTING AND COPPER DEPARTMENTS OF NAVAL GUNPOWDER MILL. *F. Harada. Abstr. as follows from Naval Med. Assn. Bull., Tokyo, Sept., 1926, vol. 15, p. 8, in Jour. Am. Med. Assn., Dec. 11, 1926, vol. 87, p. 2036.*

Of seventeen men in the copper department and six in the printing department of a gunpowder mill who were examined by Harada for lead poisoning, nineteen had slight symptoms of lead poisoning (decay of teeth and appearance of basophilic granular red blood cells).—K. R. D.

THE EXCRETION OF LEAD BY NORMAL PERSONS. *R. A. Kehoe, G. Edgar, F. Thamann, and L. Sanders. Jour. Am. Med. Assn., Dec. 18, 1926, vol. 87, pp. 2081–2084.*

The authors report that in a series of sixty-five apparently normal, healthy workmen, chosen at random and found to be secreting lead in the feces or urine or in both, not one was suffering from lead poisoning. They also conclude that there are certain unknown means of exposure to lead so widespread that most persons have absorbed appreciable quantities, as evidenced by their secretion of lead; that there is no diagnostic value in qualitative lead determinations in the excreta of persons suspected of having lead poisoning; and, finally, that there is at present no quantitative expression of lead secretion in man which may be said to be significant of impending or present lead poisoning.—K. R. D.

ETHYL GAS. *F. Schwarz. Abstr. as follows from Schweiz. med. Wchnschr., July 17, 1926, vol. 56, p. 689, in Jour. Am. Med. Assn., Oct. 2, 1926, vol. 87, p. 1162.*

Schwarz points out that tetraethyl lead which is being added in a proportion of 1:1,000 to gasoline, is two hundred times more deadly than strychnine. Concentrated hydrocyanic acid is its only rival. Besides this, there is a danger of universal lead poisoning. He figures that every yard

length of a street on which 2,000 automobiles are passing every hour, would be covered in a year by 36 gm. of lead in the form of dust.

RADIOACTIVE MATERIAL AN INDUSTRIAL HAZARD? *F. B. Flinn. Jour. Am. Med. Assn., Dec. 18, 1926, vol. 87, pp. 2078–2081.*

From experiments and from his study of individuals engaged in painting the dials of watches with luminous paint containing radium or mesothorium, Flinn concludes that an industrial hazard does not exist in the painting of luminous dials.

EXPERIMENTAL RESEARCH ON TIN POISONING. *H. Handovsky. Abstr. as follows from Arch. f. exper. Path. u. Pharmakol., July, 1926, vol. 114, p. 39, in Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, pp. 1075–1076.*

Handovsky studies the effect of aromatic and aliphatic compounds of tin in the acute and chronic poisoning of animals. Acute poisoning shows an effect typical for heavy metals. In chronic poisoning there is a diuretic effect. Heavy metals with low atomic weight seem to be eliminated chiefly in the feces; with high atomic weight chiefly in the urine.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

PULLMAN PORTERS ALL VACCINATED. *N. Y. State Dept. Health, Health News, Aug. 9, 1926, vol. 3, p. 126.*

As a prerequisite to employment by the Pullman Company as a porter a negro must now show evidence of a recent successful vaccination or be vaccinated. The examining physician must satisfy himself that the scar is less than five years old where vaccination has been done; if it is older than this, at least one attempt at reinoculation is required. Applicants must also be examined as to physical fitness. About 12,000 negroes are employed by the Company as car porters.—B. A.

TRAUMA AND TUBERCULOSIS. *J. Åkerman. Abstr. as follows from Hygiea, Stockholm, Aug. 15, 1926, vol. 88, p. 577, in Jour. Am. Med. Assn., Nov. 6, 1926, vol. 87, p. 1600.*

Åkerman does not regard it as probable that a local injury is able to induce the development of a tuberculous lesion in previously healthy tissue, or a process at this point secondary to a lesion elsewhere. The trauma merely calls attention to a previously existing lesion, he thinks.

TUBERCULOSIS IN NURSES. *Mücke. Abstr. as follows from Beitr. z. Klin. d. Tuberk., Aug. 7, 1926, vol. 64, p. 155, in Jour. Am. Med. Assn., Nov. 27, 1926, vol. 87, p. 1871.*

Mücke believes that in explaining the incidence of tuberculosis in hospital nurses new infection is of less importance than lowered resistance from overwork, especially in the case of the younger nurses. With lowered resistance conditions become favorable for activation of preexisting foci. Of seventy-four tuberculous nurses at the Eppendorf General Hospital, Ham-

burg, it was found that in 45 per cent. there was either tuberculosis in the family or a suspicion of tuberculosis in the personal history.—K. R. D.

ANTHRACOSIS AND TUBERCULOSIS. *A. Schlossmann. Abstr. as follows from Klin. Wchnschr., Sept. 17, 1926, vol. 5, p. 1786, in Jour. Am. Med. Assn., Dec. 4, 1926, vol. 87, p. 1955.*

Schlossmann injected a suspension of soot in oil intravenously and thereby produced anthracosis of the lungs. Tuberculosis was not unfavorably influenced by such injections.—K. R. D.

PULMONARY TUBERCULOSIS IN WORKERS. *A. E. Rouse. Abstr. as follows from Practitioner, London, Sept., 1926, vol. 117, p. 194, in Jour. Am. Med. Assn., Nov. 13, 1926, vol. 87, p. 1686.*

Rouse contends that the wearing of a proper respirator, by all the workers in trades in which the inhalation of dust is of everyday occurrence, should be compulsory, and would greatly tend to lessen the number of victims of pulmonary tuberculosis.—K. R. D.

INHALATION OF COAL DUST AND CONNECTIVE TISSUE IN THE LUNG. *K. Henius and O. Richert. Abstr. as follows from Ztschr. f. Tuberk., Oct., 1926, vol. 46, p. 123, in Jour. Am. Med. Assn., Jan. 22, 1927, vol. 88, p. 287.*

Henius and Richert inoculated rabbits with tuberculosis and treated them simultaneously with inhalations of coal dust. Three months of treatment did not induce a development of connective tissue in the tuberculous lungs. The coal dust was usually equally distributed in the alveoli and in the interstitial tissue, and often a more pronounced accumulation of dust was noted around tuberculous foci. The inhalations were without effect on the type of tuberculosis.—K. R. D.

INDUSTRIAL PLANT HOLDS ANNUAL CHEST CLINIC. *N. Y. State Dept. Labor, Health News, Jan. 3, 1927, vol. 4, p. 2.*

Once a year the plant of the Oneida Community Silver Industries at Sherrill holds a chest clinic in order that any cases of tuberculosis developing among the employees may be recognized during the early stages when the disease is more easily curable.

INDUSTRIAL FATIGUE IN CONNECTION WITH TUBERCULOSIS. *E. L. Collis. Abstr. as follows from Tubercle, Nov., 1926, vol. 8, p. 49, in Jour. Am. Med. Assn., Jan. 22, 1927, vol. 88, p. 280.*

The inference is drawn by Collis that phthisis mortality in late middle life is an expression of lowered resistance to tuberculous infection, owing to the lungs having become pathologically injured. The evidence presented points to such pathologic injury as being an end-result of overstrain resulting from chronic fatigue, or of industrial life which appears in the past, at any rate, to have engendered a condition in middle life favorable to chronic phthisis. If the influences of malnutrition in early adult life and of overstrain in middle life have any meaning, they suggest the need (*a*) for stimulating anabolism in patients up to 30 years of age, and (*b*) for prolonged rest in the case of patients in middle life; that is to say, the age of the patient should be as important a

factor in determining treatment as is the clinical condition.—K. R. D.

THE PART PLAYED BY CONTAGION IN TUBERCULOSIS AMONG ADULTS. *S. J. Maher. Am. Rev. Tuberc., Jan., 1927, vol. 15, pp. 55–64.*

The author studied 200 cases of adult tuberculosis under treatment in sanatoria in Connecticut and found that the histories of hardly more than 5 per cent. indicated that the disease could have been caused by contagion in childhood; that hardly more than 5 per cent. could have been caused by contagion in adult life; and that in not more than 1 per cent. was there a strong probability that the disease was caused by contagion in adult life.

The histories of 6.5 per cent. of the 200 cases indicated a possibility of infection from drinking tuberculous milk.

In 50 per cent. of the 200 cases, the patients had been engaged for long periods in dusty occupations. The offending material was cotton dust in 21 instances, woolen dust in 4, metal dust (steel and brass) in 19, stone dust in 30, cloth dust in 5, wood dust in 10, silk mill dust in 3, tobacco dust in 4, hard rubber dust in 2, saloon sweeping dust in 1, and celluloid dust in 1. Some of the patients had worked in more than one kind of dust.

In 11 cases noxious fumes were the suggested cause: fumes from molten lead in 3 cases, fumes from hat factory steam rooms in 3, acid fumes in 1, gasoline fumes in 1, lacquer fumes in 2, and spelter fumes in 1.

In 6 cases the patients had apparently developed the disease when working too many hours with inadequate food, sleep, and sunlight.—E. O.

PROTECTION OF THE HEALTH OF SEAMEN AGAINST VENEREAL DISEASES. *Internat. Labour Office, Studies and Rep., Series P (Seamen) No. 2, 1926, pp. 72.*

VENEREAL DISEASE AND THE MERCHANT SEAMAN. *L. W. Harrison. Abstr. from World's Health, 1926, vol. 7, pp. 244–249, in Bull. Hyg., Nov., 1926, vol. 1, pp. 859–860.*

The primary object of the article is the stimulation of those interested, whether from economic or philanthropic motives, to do everything possible to combat venereal disease in merchant seamen. Successful combating of venereal disease is not only philanthropy but good business.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

PROTECTING THE HANDS AGAINST GASOLINE AND NAPHTHA. *Jour. Am. Med. Assn., May 22, 1926, vol. 86, p. 1643.*

Protection of the hands against the de-oiling action of naphtha and gasoline in the dry cleaning industry, where oily applications cannot be used for fear that the garments being cleaned may come in contact with these oily substances, may be secured in the following manner:

> . . . . thorough cleansing of the hands and arms at the end of the work period with a soap that lathers freely. Immediately afterward the hydrous wool fat or oil of

theobroma should be rubbed into the skin of the hands and forearms thoroughly. The application of oily material should be repeated in the morning, and once or twice during the day if the circumstances of work warrant. Some workers become so susceptible as to require a change of occupation. At the first indication of the dermatitis, the worker should be taken away from exposure to the irritants and should be treated with a weak solution of aluminum acetate. If the condition is severe, the use of aluminum acetate for three or four days should be followed with applications of zinc oxid, 10 per cent, in olive oil.

OCCUPATIONAL DERMATITIS OF THE HANDS AND FOREARMS FROM THE GATHERING OF CELERY. *P. Legrain and R. Barthe. Bull. Soc. franç. de dermat. et syph., Nov., 1926, pp. 662–664.*

A market gardener aged 30 years had been engaged for ten days in gathering celery. Both forearms, hands, and backs and sides of the fingers then broke out in an acute eruption. This consisted of large vesicles on a red and edematous surface. Between the fingers the vesicles were small, simulating dyshidrosis. The parts most affected were about the thumb, the first finger, and the radial border of the right wrist, especially the right side. With his right hand he removed certain portions of the vegetable and thus it became specially covered with the fresh juice. He cut about 350 stalks daily.

Leaving this work for twelve days, by simple treatment he became completely cured. Reexposure to the sap of the plant, but not in quite such a fresh state, brought out the same kind of rash, with a distinct tendency to be less limited. The patient again quitted this work altogether and the trouble rapidly disappeared.

These writers say that the aromatic oil of celery is allied to that of parsley and that the eruption is very similar to the one caused by cow parsnips, a rash which is well known in Belgium. This is the first word of this particular form of dermatosis.—R. P. W.

SPOROTRICHOSIS, AN OCCUPATIONAL DERMATOSIS. *H. R. Foerster. Jour. Am. Med. Assn., Nov. 13, 1926, vol. 87, p. 1605.*

Foerster discusses the distribution, etiology and pathogenesis, symptomatology, diagnosis, and treatment of sporotrichosis, directs attention to the occurrence of this condition as an endemic disease in the gardening industry and as an occupational hazard among those engaged in farming and horticulture, and, finally, emphasizes the importance of the barberry shrub as a possible source of the infection.—K. R. D.

INDUSTRIAL SURGERY

RÔLE OF ILIOLUMBAR LIGAMENTS IN LOW BACK STRAINS. *C. L. Lowman. Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, pp. 1002–1003.*

The iliolumbar ligaments, "aside from acting for lateral stabilization, are also suspensory in function, and in this capacity tend to act as a second line of defense in bearing the stress of body weight" whenever a laxity occurs in the sacro-iliac ligaments enough to allow sagging of the sacrum. This

condition is frequently seen in patients whose occupation requires rotation of the spinal column, such as shoveling or running hoisting machinery, in which the right hand constantly reaches forward to pull levers, and is most common "in patients with a loose sacroiliac joint, in cases of spondylolisthesis, and in patients in whom roentgen ray demonstrates one or both sacrolumbar interarticular processes to be crescentic or flattened, as pointed out by Goldthwait." Dr. Lowman concludes: "Hence when there is evidenced irritation and symptoms of ligamentous strain in them, we are justified in looking for the cause in some alteration in sacrolumbar relations."—E. O.

TREATMENT OF CUTANEOUS BURNS. *F. W. Bancroft and C. S. Rogers. Abstr. as follows from Ann. Surg., July, 1926, vol. 84, p. 1, in Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, p. 1065.*

In the local treatment of cutaneous burns, Bancroft and Rogers recommend the use of a 2.5 and 5 per cent. aqueous solution of tannic acid as a wet dressing for twenty-four hours, as first advocated by Davidson. When the burned area becomes a mahogany brown, the dressing is removed and the patient is treated with heated dry air. Usually a tent is erected over the bed and electric lights are inserted. The patient is kept as surgically clean as possible. Patients treated by tannic acid have a firm mahogany membrane in the burned area—healthy skin is apparently unaffected by the treatment. The tanned area has a leathery consistency. Less pain is associated with this method of treatment than with any other procedure. The systematic treatment of fluid depletion is also of great value.

BURNS TREATED BY TANNIC ACID. *C. S. Beck and J. H. Powers. Abstr. as follows from Ann. Surg., July, 1926, vol. 84, p. 19, in Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, p. 1065.*

Beck and Powers also [see preceding abstract] recommend this treatment and urge that it be popularized. The solution can be made by the laity by mixing four teaspoonfuls of the dry powder in a glass of water. This will make approximately a 2.5 per cent. solution. Tannic acid is easily procured and can be kept indefinitely as a powder. It should form an important adjunct to the equipment of first aid stations of steel mills, mines, factories, etc., so that immediate application, either by means of compresses or the spray, could be carried out.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

PNEUMATIC RUPTURE OF THE SIGMOID. REPORT OF A CASE. *F. B. Block and M. I. Weissman. Jour. Am. Med. Assn., May 22, 1926, vol. 86, pp. 1597–1599.*

A case of injury of the lower part of the large intestine caused by trauma resulting from the careless use of compressed air is here reported, in a man, aged 45, a machinist. While standing

at work with a compressed air hose, one of his fellow workers, as a practical joke, placed the nozzle of the air hose about an inch from his rectum. The patient had his clothes on and stated that the nozzle, which was about ¼ inch in diameter applying a pressure of about 125 pounds, was placed diagonally against the anus.

From their study of the few cases of this type of injury reported, the authors state:

> Pain was the first symptom complained of in the majority of cases, although in ours and a few other cases it did not come on until a few hours after the accident. The pain is severe and continuous in character. The face is usually sallow and somewhat cyanotic, the facial expression anxious and pinched. The abdomen is enormously distended, the skin very tense, the percussion note tympanitic, very little if any abdominal breathing caused by the pressure of the air against the diaphragm, and the patient may or may not be conscious. The temperature is usually normal or subnormal at the beginning, and later rises. The respirations are increased; the pulse rate increases somewhat, but its volume varies in the proportion to the amount of internal hemorrhage and degree of shock; nausea and vomiting are commonly present. Rectal hemorrhage is usually absent.
>
> With the history of working around air under pressure, with the characteristic barrel shaped abdomen with its tense wall and tympanitic note, the thoracic breathing and the general symptoms of an abdominal injury, the diagnosis should not be overlooked.

The following summary and conclusions are given:

1. Warning should be posted in all industries using compressed air.
2. A column of air under pressure rushing from a nozzle which does not touch the body may enter the bowel and cause fatal injury.
3. The diagnosis should easily be made from the physical findings.
4. The anus and rectum escape injury because of their outside support, the sigmoid being the viscus usually injured.
5. Prompt evacuation of the air by emergency puncture and early laparatomy offer the best chance of recovery.

—E. O.

PRACTICAL JOKES WITH COMPRESSED AIR. *Lancet, Nov. 20, 1926, vol. 2, p. 1095.*

Compressed air is coming more and more into use in industry for actuating drills and for riveting. The compressed air tube is sometimes used for dusting down the clothes on completion of work; sometimes by misguided humor a worker may direct the current to the rectum of an unsuspecting companion. Disaster with rupture of the bowel may follow. The air can force itself through several layers of clothing in such cases. One instance is reported of a fatal accident caused by a workman's placing the end of the hose between his teeth; he slipped; the air stream got turned on and ruptured his esophagus. Workmen using compressed air should always be warned of such dangers due to its wrongful use.—E. L. C.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

WAGES AND HOURS OF LABOR IN THE LUMBER INDUSTRY IN THE UNITED STATES: 1925. *U. S. Bur. Labor Statistics, Bull. No. 413, June, 1926, pp. 88.*

HOURS AND EARNINGS IN ANTHRACITE AND BITUMINOUS COAL MINING, 1922 AND 1924. *U. S. Bur. Labor Statistics, Bull. No. 416, Sept., 1926, pp. 92.*

LABOR COST OF PRODUCTION AND WAGES AND HOURS OF LABOR IN THE PAPER BOX-BOARD INDUSTRY. *U. S. Bur. Labor Statistics, Bull. No. 407, Oct., 1926, pp. 89.*

WAGES AND HOURS OF LABOR IN THE SLAUGHTERING AND MEAT-PACKING INDUSTRY, 1925. *U. S. Bur. Labor Statistics, Bull. No. 421, Jan., 1927, pp. 149.*

UNION SCALE OF WAGES AND HOURS OF LABOR, MAY 15, 1926. *U. S. Bur. Labor Statistics, Bull. No. 431, Feb., 1927, pp. 212.*

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

VOCATIONAL GUIDANCE IN THE UNITED STATES OF AMERICA. *Abstr. as follows from Internat. Labour Rev., Jan., 1926, vol. 13, pp. 48–68, in Bull. Hyg., Dec., 1926, vol. 1, p. 981.*

The need for vocational guidance and for looking upon education in youth as a preparation for occupation is rapidly coming to be recognized. Articles dealing with the subject in Germany and in Soviet Russia appeared in the same journal in April and September, 1925. In America, as elsewhere, the movement is yet in its infancy, but its importance to future health and well-being cannot be gainsaid; it originated from the pioneer efforts of Professor Parsons at Boston in 1901. Interest was aroused, and in 1910 New York created an office for directing the careers of young persons. In 1918 the Junior Placement Division of the United States Employment Service came into being; it offers "a scientific means of effectively distributing the school product," and holds that education does not end when the pupils leave school. Everyone can be found work, a person not qualified for one trade being capable of succeeding in another. The work today is organized as an educational function, and record cards are now generally kept in schools, for use in choice of an occupation. Physical disabilities and tendency to illness, among other things, are recorded; but as yet the part played by the medical profession is limited and indirect. The scholars have industries explained and are taken to see occupations. Psychologic tests for discovering aptitudes are rather receding from the high claims once made for them, and today interest is held to be one of the most useful of vocational guides; it is closely related to ability. Monographs are published to enable teachers to adapt instruction to future vocational needs, to assist guidance officers in placing young persons, and to aid pupils in the choice of occupation. The training of vocational guidance officers is undertaken by a number of colleges and universities; an outline of the Boston course is given. The article exhibits how vocational guidance is taken seriously in the United States, and that the movement is surely spreading.

J. I. H.
July, 1927

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

CARBON MONOXIDE POISONING ON A SHIP AT SEA. *Brit. Med. Jour., Jan. 8, 1927, vol. 1, p. 86.*

"A correspondent sends an account of an oil tanker in ballast which arrived at a foreign port with the captain dead and the first and second engineers ill from carbon monoxide poisoning. He states that in cleaning out the holds in readiness to take a cargo of gasolene the pump had to be taken apart. The second engineer descended to the hold and fell on his back, face upwards. The first engineer heard of the accident, went down, and, as he set foot in the hold, fell similarly, face upwards. The captain, learning of the double casualty, without waiting to put on a gas mask, and being a powerful man, went down at once, but, before reaching the bottom of the ladder, fell under the pump, face downwards. The three men were brought up to the deck in less than ten minutes; the two engineers were bleeding from the nose and mouth. Artificial respiration restored the engineers after one and a half hours, but the captain appeared to have died instantaneously. The ship

had previously carried a cargo of benzine, and our correspondent emphasizes the necessity of the Board of Trade insisting that anybody who enters a tanker's hold should be obliged to wear a gas mask. In this particular instance gas masks were available on the deck, though they were not used. He adds that this occurrence should also serve as a warning that care must be taken when 'breaking the pump,' which in this case was evidently a death trap."

POISONING WITH CARBON TETRACHLORIDE. *J. K. W. Kehrer and A. J. F. Oudendal. Abstr. as follows from Nederl. Tijdschr. v. Geneesk., 1926, vol. 70, pp. 746–757, in Chem. Abstr., Feb. 20, 1927, vol. 21, p. 610.*

The writers observe central necrosis of the liver with fatty degeneration of liver and kidney, resulting in acute icterus followed by death.—P. D.

CARBON MONOXIDE A COMMON PERIL. *E. E. Fisher. Safety Engin., Feb., 1927, vol. 53, pp. 89–92.*

A brief discussion of carbon monoxide poisoning as a frequent cause of industrial and domestic accidents.—R. M. T.

DUST HAZARDS AND THEIR EFFECTS

METHOD OF DETERMINING THE DUST CONTENT OF THE AIR: THE BILATERAL RHEOMETER AND ITS APPLICATION. *G. W. Pigulewsky. Gigiena Truda, 1926, no. 2, pp. 13–15.*

The electrical dust suction appliances employed for the determination of the dust content of the air were modified by the laboratory to suit the requirements of the industrial hygiene inspection authorities, and for those cases where the air must be allowed to pass through a proportionally narrow tube. A metal tube is screwed on to the entrance opening of the suction apparatus to prevent heating without reducing the maximum amount of air drawn in. If two tubes are used, two samples of the air can be taken; this is of importance for the purposes of control. A bilateral rheometer, illustrated in the text, was constructed for this purpose.

Wadding is employed as the filtering material, which is lodged in an extension piece. Practice having shown that these extensions were frequently broken, especially at the ends, the laboratory recommended a special support in the form of a case which admits six extensions.—A. W. N.

WHAT IS KNOWN ABOUT THE EFFECT OF SMOKE ON HEALTH. *W. C. White. Safety Engin., Feb., 1927, vol. 53, pp. 81–85.*

The physiologic effects of smoke are reviewed over a period of 200 years, from Ramazzini to the Pittsburgh survey of 1914. Some experiments carried out in Pittsburgh seem to indicate that the breathing of smoke laden air has no demonstrable influence on the prevalence of tuberculosis but has a decided relation to high pneumonia mortality and the incidence of acute respiratory diseases. The effects of inhaling carbon dusts and other particulate matter in smoke are discussed.

The author points out the need for a carefully planned study on the effect of smoke upon health, with Pittsburgh as the experimental center.—R. M. T.

SMOKE ABATEMENT, ITS EFFECTS AND LIMITATIONS. *H. B. Meller. Abstr. as follows from Mech. Engin., 1926, vol. 48, pp. 1275–1283, in Chem. Abstr., Feb. 20, 1927, vol. 21, p. 639.*

A detailed discussion of smoke abatement in the Pittsburgh district, including legal regulation and methods of enforcement. Detailed data are given for the deposition of insoluble dust for various periods between 1913 and 1924. For ten observation stations in this district the August, 1923, and June, 1924, average was 1,305 tons insoluble dust per square mile per month, compared to 938 tons for the corresponding 1912 to 1913 period, a 39 per cent. increase. The 1923 to 1924 figures are, however, lower than the 1916 values (not given in the same detail). One may note that a five-year average for the same monthly periods in London showed only 195 tons insoluble dust per square mile per month. Detailed analyses of insoluble deposits are given, the average (1923 to 1924) being tar 0.22 per cent., fixed carbon 35.6 per cent., ash 62.5 per cent. The abatement problem is also discussed from the standpoint of proper design and firing of power plant and locomotive boilers.—P. D.

RESPIRATORS. *M. Marschak. Gigiena Truda, 1926, no. 2, pp. 3–12.*

In the laboratory for industrial hygiene of the Institute for Labor Protection the respirators commonly in use were subjected to an examination, the filter as the principal element receiving special consideration. In the test, finely ground, soluble Prussian blue was employed as dust. The quantity of dust that remained in the filter and of that which had passed through it was determined colorimetrically.

The investigation showed that a respirator with a filter of cotton wadding or of sponge, in order to be practical, must be so constructed that the soiled wadding or sponge can be easily and quickly replaced by clean materials; furthermore, the wadding or sponge for the filter must be used in strictly determined quantity, varying with the requisite efficiency of the filter: maximum retention of dust with minimum increase of resistance. The part of the respirator that touches the face must be so fashioned that the edges can be easily adjusted to the individual features of the face. The presence of exhalation valves is unconditionally necessary.

In addition to filters of wadding and of sponge, metal filters are also used. These consist of separate little plates, which are placed parallel and a certain distance apart, and so that the openings in each will alternate with the openings of the others. In this manner, the inhaled air has to travel a winding course in the filter, and the dust, by the changing direction of the passage, is deposited on the walls of the plates. In the laboratory experiments the metal filters permitted 15 to 18 per cent. of the dust to pass through with a resistance equivalent to 68 mm. of water pressure. After 0.01 to 0.3 gm. of dust had been retained, the resistance of the metal filter was unchanged, in contrast to the filters with wadding or sponge.

In the laboratory, oats in a layer 3 cm. long by 4 cm. wide were also successfully employed as a filter in the respirator. The resistance of this kind of filter was equivalent to 3 to 4 mm. of water pressure; owing to the immense surface of adsorption, the dust was retained in a very considerable quantity, at least 90 per cent. of all dust. On this account, the soiling of the filter with dust, even in large quantities, had very little effect on the filter's resistance.

On the basis of the results of these investigations, the laboratory prepared special patterns of respirators and transferred further observations to the works, for the purpose of testing, improving, etc., and adapting the results to use in industry.—A. W. N.

A Contribution to the Clinical Picture of Pneumonokoniosis. *G. Schellenberg. Beitr. z. Klin. d. Tuberk., 1926, vol. 63.*

Some Chemical and Engineering Aspects of Dust Explosions. *D. J. Price. Safety Engin., July, 1926, vol. 52, pp. 19–25.*

The use of inert gases for the prevention of flame propagation where an ignition source cannot be entirely eliminated, as in grinding and pulverizing operations, is recommended. Several explosibility factors—fineness of dust particles, relative humidity, and static electricity—are also discussed.—R. M. T.

Dust Explosion Hazard in Fire Fighting. *D. J. Price. Safety Engin., Nov., 1926, vol. 52, pp. 209–214.*

The following precautionary measures are recommended: (1) Before removal of the contents of bins and the like in which a fire has occurred and has apparently been extinguished, the bin should be flooded and the contents thoroughly wet down. (2) Systematic inspection of plants should be carried out by firemen to acquaint them with dust explosion hazards. (3) It is better to use a spray nozzle rather than the full stream of water from the hose in instances where explosive dusts are stored in piles.—R. M. T.

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

Occupational Dermatoses. *Berlin Letter, Jour. Am. Med. Assn., Dec. 11, 1926, vol. 87, p. 2015.*

The section on dermatology of the Berliner medizinische Gesellschaft took up the topic "Occupational Dermatoses with Special Relation to Industry." Injury does not necessarily result when conditions for the harmful effect are present. An essential is a predisposition to the disease. The discovery of evidences of sensitiveness and the determination of their causes are comparatively easy in large manufacturing plants in which identically the same irritants act on unequally sensitive skins. In a person truly idiosyncratic, the eruption will appear on the first contact with minimal amounts of the irritant; a second group becomes susceptible only after long contact, and a third group remains unsusceptible to every contact. There are also a large number of plants and plant derivatives which cause skin irritation or cutaneous inflammation

in every person; for example, croton oil and volatile oil of mustard. In the vegetable canning factories of Brunswick, it was found that a large number of workers may be engaged, some for a shorter and some for a longer period, in the processing of asparagus without evidence of harmful action, until they finally become sensitized. It was brought out that, in some instances, skin diseases are caused not by the plants themselves but by some form of parasitic fungus, hairy caterpillars or mites, or even mechanical factors. Of plants that cause skin eruptions, the most important are the Japanese (and other) primroses, and North American and Japanese varieties of sumac (*Rhus*). In woodworkers, especially polishers and varnishers, the sawdust, and in the latter the turpentine, plays a significant rôle; in orange peelers, the ethereal oil from the peeling is the offending substance, while workmen in chemical factories may be affected by many different substances.—K. R. D.

THE MENTAL FACTOR IN MINERS' NYSTAGMUS. *H. W. Eddison. Abstr. as follows from Jour. Ment. Science, April, 1926, vol. 72, p. 201, in Arch. Neurol. and Psychiat., March, 1927, vol. 17, p. 402.*

This report to the Medical Research Council is especially interesting in its discussion of psychoneuroses that have all the features of miners' nystagmus except the nystagmus. It is stated that the fact that there is constant danger in the mines is as important as that there is poor light. The tremor is considered equivalent to the tremors of the hand or leg of war neuroses. Suggestion plays a part in several ways: The eyestrain suggests the local target for the disturbance; the wide advertising of the disease, especially since the institution of compensation, suggests the symptoms. Prevention should forbid the employment of persons with a psychoneurotic make-up as miners, and should provide better illumination of the coal face. Perhaps the author takes for granted prevention by increasing the safety of the miners, or regards this as hopeless.

EYE INJURIES IN METAL INDUSTRY. *A. Belsky. Klin. Monatsbl. f. Augenh., 1926, vol. 77, p. 746.*

CONTACT LOCALIZATION OF INTRAOCULAR FOREIGN BODIES. *J. M. Patton. Am. Jour. Ophth., Feb., 1927, vol. 10, pp. 96–100.*

"With a skilled radiologist, a steady patient and a foreign body large enough to cast a shadow, geometric methods of localization are satisfactory. But if the eyes move during exposure the radiogram may give a false position for the foreign body. Particles of metal fastened to the eyeball move with it, preventing a false impression. Various methods of attaching such localizers are mentioned, and a satisfactory one described in detail."

TOLERANCE TO FOREIGN BODIES WITHIN THE POSTERIOR SEGMENT OF THE EYE. *A. E. Bulson. Jour. Am. Med. Assn., Dec. 18, 1926, vol. 87, pp. 2071–2077.*

The author concludes that, in the majority of cases, loss of vision as well as loss of the eyeball is due to inflammatory, degenerative, and structural changes brought about directly or

indirectly by the trauma and infection, and not to the mere presence of a foreign body in the posterior segment of the eye, and that the removal of the foreign body does not in itself improve the prognosis, as it is very probable that ultimate loss of vision, eyeball, or both, in a series of comparative cases, would be as conspicuous in cases in which extraction had been performed as it would be in those in which extraction had not been performed. He also believes that in a large percentage of cases the patient is as well off if the foreign body is left in the posterior segment of the eye as he would be if it is extracted, particularly if the eye traumatism would be increased by the extraction.

The cases reported indicate that preservation of useful and even fairly normal vision, or eyeball, or both, is possible for prolonged periods of time, perhaps during the lifetime of the patient, with retention of a foreign body in the posterior segment of the eye.

The plea, therefore, is made that there should be less haste in advising enucleation, and less general inclination to be energetic in endeavors to extract foreign bodies from the posterior segment.—K. R. D.

EYES FOR THE JOB. *L. Resnick and L. H. Carris. Hygeia, Jan., 1927, vol. 5, pp. 25–26.*

Figures are given to support the authors' claim that one out of every two employees in shops, offices, and stores cannot see clearly what he is doing. An even higher percentage is reported by Dr. Earle B. Fowler. In his chapter on eye conservation in the American Engineering Council report on waste in industry, he shows that 61 per cent. of 16,581 employees in several industries had defective vision. He found that the percentage of defective vision is highest among the very workers that have greatest need of good vision. In one plant where a great deal of close fine work is done, only 8.4 per cent. of the employees did not need glasses; 8.3 per cent. wore glasses that were satisfactory; and 83.3 per cent. needed glasses.

Prevalence of defective vision may be explained by the following facts: Modern life demands that the eyes be used more intensely and for longer periods; many workers (foreigners, especially) are afraid to go to an eye clinic or hospital, and they yield to the temptation to buy spectacles from the 10 cent store; there is a traditional dislike for glasses by a certain type of workman who feels that wearing glasses is an indication of senility.

The employer who is not convinced through the experience of others owes it to himself, his business associates, and his workmen to investigate in his own plant the prevalence of defective vision and the extent to which it interferes with efficiency and increases the frequency and the severity of industrial accidents.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

ACCIDENTS IN THE DOBRUSCH PAPER FACTORY. *R. Asbel. Gigiena Truda, 1926, no. 2, pp. 66–75.*

The inspection authorities investigated 222 accidents (giving a rate of 150 per thousand) which occurred in

the factory during the period Jan. 1 to Oct. 1, 1925. Among all the accidents not one was fatal; in 73 per cent. there was a loss of time through disability of less than ten days, and in 5 per cent. a loss of more than thirty days.

Handling cases and other work with burdens were responsible for the largest number of accidents; mechanical contrivances came second. The greatest number of accidents occurred to workers who had been employed but a short time; on the other hand, workmen who had served sixteen years and over were also responsible for a fairly high percentage (17 per cent.) of the accidents, probably owing to their advanced age. Most of the accidents were traumatic injuries to the extremities: 38.7 per cent. to the upper extremities, and 35.1 per cent. to the lower.

Distribution of the accidents among the days of the week is not characteristic, since the work is performed in shifts and the days of rest fall on different days of the week.—A. W. N.

Industrial Accidents in the Coal Mines of Tula. *D. Kowarsky. Gigiena Truda, 1926, no. 2, pp. 76–78.*

The traumatic accidents in the mines have been worked out statistically for the year 1924 and the first quarter of 1925.

For every thousand full time workers in the industry (those who had performed the entire twenty-five shifts for the month) the monthly average in three different districts of Tula for the first quarter of 1925 was 19.2, or nine accidents. Only the minor accidents had increased (in the first quarter of 1924 there was a monthly average rate of 5.4, or eight accidents); the severe and fatal accidents, on the contrary, had decreased not only relatively but absolutely. This circumstance is to be attributed to the strict control on the part of the labor protection authorities and to the removal of the most threatening of the evil conditions. It is the author's opinion that the increase in accidents is due in part to the concentration of production and the increase in work performed, and in part to the better recording of accidents.—A. W. N.

Accidents in Mines. *Berlin Letter, Jour. Am. Med. Assn., Jan. 15, 1927, vol. 88, p. 186.*

For the first time, the Prussian ministry of commerce has published detailed statistics of accidents in Prussian mines, the pamphlet covering accidents occurring in 1925. The report reveals that, in spite of all safety measures, the number of accidents is still high. In the coal mines of Prussia (exclusive of the lignite fields) about 15 per cent. of all miners, or 82,213, suffered some accidents in 1925 while underground. The number is increased by accidents happening aboveground to a total of 97,749; 1,320 of the accidents ended fatally. In the lignite fields, in which danger is less than in the black-coal fields, the number of accidents was relatively lower. The total in 1925 was approximately 10,000, only 126 of which resulted fatally. The number of accidents in the ore mines was 3,407, with seventy-five deaths. Including the salt mines and the petroleum wells, the total number of accidents in the mining industries in Prussia in 1925 amounted to 113,169, which resulted in 1,564 deaths. The mining district about Dortmund shows the greatest number

of accidents (74,224), with 1,093 deaths. In descending order, the districts about Breslau, Bonn, and Halle follow. The year 1926 does not seem to offer much prospect of improvement, for during the first quarter 26,688 accidents were recorded, 285 of which proved fatal. The Prussian ministry of commerce plans to publish these statistics at definite intervals.—K. R. D.

MENTAL DISEASE AND ACCIDENTS. *W. Enke. Ztschr. f. d. ges. Neurol. u. Psychiat., Aug. 31, 1926, vol. 104, p. 121.*

ACCIDENT PREVENTION IN WORK WITH GRINDING MACHINES. *A. Bronewsky. Gigiena Truda, 1926, no. 2, pp. 79–84.*

Mechanical appliances for grinding and polishing instruments and other articles constitute a great accident risk and health hazard. The accident risk is due to the bursting of the grindstones and grinding wheels, and to injuries to the eyes of the workers from flying particles; and the health hazard to the development of dust in the dry process, and to the moisture in the wet process.

All the precautions taken against the bursting of stones and wheels are minutely described.—A. W. N.

PROTECTIVE SPECTACLES FOR WORKMEN. *R. Hessberg. Klin. Monatsbl. f. Augenh., 1926, vol. 77, p. 575.*

HOW A DEPARTMENT OF LABOR ASSISTS IN THE REDUCTION OF INDUSTRIAL ACCIDENTS. *A. F. McBride. Safety Engin., Sept., 1926, vol. 52, pp. 116–118.*

This is an outline of the activities of the New Jersey State Department of Labor, with special reference to health and personal safety in industrial establishments.—R. M. T.

METROPOLITAN LIFE INTERESTED IN INDUSTRIAL SAFETY. *W. G. Coyle. Safety Engin., Sept., 1926, vol. 52, pp. 121–123.*

The Metropolitan Life Insurance Company has created a Policyholders' Service Bureau with industrial safety as an important part of the service; 2,324 firms have taken out group insurance with this Company, covering a total of 795,888 industrial workers. The industrial safety work is conducted as a voluntary service to this group of policyholders and supplements the work conducted by casualty insurance companies. All safety surveys are made from a purely service standpoint and are not for rate determination.—R. M. T.

THE THREE STAGES OF SAFETY WORK. *S. W. Ashe. Nat. Safety News, Sept., 1926, vol. 14, pp. 11–13.*

An analysis is here given of the problems of safety management in (1) the industry about to start accident prevention work, (2) the industry with a general plan in effect that desires to go further but has no fully organized safety department, and (3) the industry with a regular safety department that has employed all the ordinary measures for accident prevention but has reached a saturation point and cannot make further progress.—R. M. T.

WHERE THE MANAGEMENT'S INFLUENCE KEEPS ACCIDENT RATES

Low. *G. M. Briggs. Nat. Safety News, Sept., 1926, vol. 14, pp. 15–17.*

This is a description of some of the features of the safety work at the plant of the Bunting Brass and Bronze Company, Toledo, Ohio, where during a period of eight years no fatal or permanently disabling accident has occurred to any of the 500 employees.—R. M. T.

Industrial Safety Codes Approved. *Safety Engin., Nov., 1926, vol. 52, pp. 226–227.*

The American Engineering Standards Committee has announced its approval of the following codes: protection against dust explosions; safety code for paper and pulp mills; gas safety code.—R. M. T.

Safety Progress in English Steel Plants. *W. H. Gordon. Safety Engin., Feb., 1927, vol. 53, pp. 75–80.*

This is a review of the results obtained and methods employed by the safety organizations of four large English steel plants in the Sheffield area.—R. M. T.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

Inquiry into the Prevailing Diet of Workmen. *Belgium Letter, Jour. Am. Med. Assn., Nov. 13, 1926, vol. 87, p. 1661.*

Dr. Van Temsche has communicated to the Société scientifique d'hygiène alimentaire the results of his inquiry into the prevailing diet of workmen in the city of Mechlin, with a view to comparing the prewar diet with the postwar diet in Belgium. The conclusions that the author of the inquiry has reached are: (1) The quantity of protein consumed per kilogram of body weight has increased in comparison with 1910; (2) the predominance of fats and carbohydrates is still marked, but there has been a slight decrease since 1910; (3) the tendency to resort to a preponderance of animal proteins as compared with vegetable proteins was in evidence in 1923; and (4) the amount of potential energy contained in the food did not, in the majority of cases, correspond to the demands of hard labor. The inquiry showed that (1) workmen do not always regulate their diet according to the nature of their work; (2) workmen do not regulate their diet according to the nutritive value of the foods that they can procure for a given sum; (3) the protein content and the energy producing value of the diet increase in the same proportion as the circumstances of the household; and (4) the percentage of persons ingesting more than 20 per cent. of their protein in the form of meat does not increase in the same proportion as the circumstances of the household. However, the percentage of persons taking more than 50 per cent. of their protein in the form of bread decreases in the same proportion as the relative wealth of the household. Finally, the average number of persons taking more than 20 per cent. of their protein requirement in the form of meat was appreciably higher in 1923 than in 1910, and, inversely, the per-

centage of persons who procure more than 50 per cent. of their protein from bread is much smaller than in 1910.—K. R. D.

NUTRITIVE VALUE OF INORGANIC SUBSTANCES: I. NORMAL ZINC METABOLISM WITH PARTICULAR REFERENCE TO CALCIUM METABOLISM. *L. T. Fairhall. Abstr. as follows from Jour. Biol. Chem., Oct., 1926, vol. 70, p. 495, in Jour. Am. Med. Assn., Dec. 18, 1926, vol. 87, p. 2125.*

The zinc metabolism of rats has been investigated by Fairhall and compared with their calcium metabolism under various conditions. Under conditions of alkaline feeding, both urinary and fecal zinc excretion are at first increased and the balance becomes negative, followed by a return to normal. Similarly, under an acid regimen both urinary and fecal zinc excretion are increased, the balance becomes negative, but remains so until the animals are returned to a normal diet. The utilization of zinc by the rat is about 1 per cent. and the amount circulating in the blood stream is about 7 per cent. of the calcium involved in each case. The rate of storage of zinc, as is the case with calcium, is greatest in the young growing animal.—K. R. D.

SEROLOGIC EXAMINATION OF WORKERS IN OVERHEATED WORKROOMS. *W. V. M. Palmieris. Abstr. as follows from Deutsch. Ztschr. f. d. ges. gerichtl. Med., vol. 7, no. 6, in München. med. Wchnschr., Sept. 24, 1926, vol. 73, p. 1638.*

The author undertook this work with a view to making a contribution to the study of the course of the hemolytic power of serum. He examined workers before and after work in overheated rooms under the most varied conditions. The total hemolytic power of serum seems noticeably reduced after such work.—M. C. S.

ON THE QUESTION OF THE INFLUENCE OF OVERHEATING THE BODY ON THE COMPOSITION OF THE BLOOD. *W. S. Sedlezky. Ztschr. f. d. ges. physik. Therap., 1926, vol. 32, no. 3.*

THE POTASSIUM AND CALCIUM CONTENT OF THE BLOOD IN PERSONS SUFFERING FROM CIRCULATORY DISTURBANCES AND ITS BEHAVIOR UNDER THE INFLUENCE OF BODILY WORK. *F. Kisch. Abstr. as follows from Klin. Wchnschr., Aug. 20, 1926, vol. 5, in München. med. Wchnschr., Sept. 24, 1926, vol. 73, p. 1638.*

From the examinations reported, it may be concluded that in all cases of circulatory disturbances with development of edema the calcium content of the blood is considerably below normal. Where no edema is present, the calcium value is normal. In cases with pronounced insufficiency, the potassium content is for the most part above normal. After moderate bodily work the potassium content in manifest circulatory insufficiency rises. In cases of well-compensated heart disease the calcium and potassium content is the same as in a normal person.—M. C. S.

WORK IN HEART DISEASE. *Eppinger et al. Abstr. as follows from Klin. Wchnschr., July 16, 1926, vol. 5, p. 1316, in Jour. Am. Med. Assn., Oct. 2, 1926, vol. 87, p. 1164.*

Eppinger, Kisch, and Schwarz found a normal oxygen saturation of the

arterial blood in patients with heart disease before and after exertion. Such was the case as a rule even with dyspnea and cyanosis. The hydrogen ion concentration of the blood usually shifted slightly toward the acid side.

PSYCHOLOGIC CONTRIBUTION TO THE STUDY OF FATIGUE DURING MAXIMUM BODILY EXERTION. I. THE INFLUENCE ON ATTENTION. *W. Ewig and T. Wohlfeil. Arch. f. Hyg., 1926, vol. 97, pp. 162–175.*

The authors, studying the fatigue of men while rowing, measured the range of attention of the subjects in recognizing letters (1) before they began to row, (2) during the rowing, until they got their "second wind" (*toten Punkt*), and (3) after they got their second wind. Their findings show that the range of attention was smaller before the subjects got their second wind than when they were at rest. It reached a minimum during the period of maximum exertion, but it rose somewhat after the subjects got their second wind. The greater the number of letters recognized, the greater was the number of errors.—C. P. Y.

FATIGUE IN CONTROLLED WORK. *O. Graf. Abstr. as follows from Ztschr. f. d. ges. Neurol. u. Psychiat., 1926, vol. 101, in München. med. Wchnschr., Sept. 3, 1926, vol. 73, p. 1499.*

A comparison between uncontrolled and controlled work made in a psychologic experiment showed a substantially greater amount of work in the controlled period than in the uncontrolled. This is explained first by the possibility of giving ever renewed attention (psychologic factor), and secondly by the fact that interposition of frequent short pauses prevents the severer effects of fatigue (physiologic factor).—M. C. S.

FATIGUE AND RECOVERY AFTER PHYSICAL WORK. *E. Simonson. Klin. Wchnschr., 1926, no. 50.*

RATIONALIZING THE DISTRIBUTION OF BOOKS. *R. Potschtarewa. Gigiena Truda, 1926, no. 2, pp. 99–100.*

The department of industrial psychology at the Institute for the Protection of Labor studied the working conditions of the people employed in distributing books at the library of the Moscow Board of Trade.

Several modifications of the work were undertaken which were so directed that the duties were more expediently divided, whereby the employees mutually relieved each other, and each one worked sitting during one and one-half hours of the six-hour working day. In this way the fatigue was lessened and the workers felt considerably better. The objective tests for fatigue (pulse, dynamometer, and tests according to the method of Bourdon) showed that neither the attention nor the physical efficiency decreased on account of the period of sitting. On the contrary, the amount of work done (the number of books distributed) was 5 per cent. greater after a two weeks' trial of this arrangement.—A. W. N.

MUSCULAR WORK. *M. S. Pembrey. Abstr. as follows from Jour. School Hyg. and Physical Education, 1926, vol. 18, pp. 285–290, in Bull. Hyg., Nov., 1926, vol. 1, pp. 921–922.*

In recent years a greater interest has been taken in the scientific study

of muscular work and the results have yielded guidance for the more efficient training of recruits for the Services and the performance of manual work in factories.

The only sound way of training the wind is the natural one, progressive exercise, especially running: this is employed by all trainers of horses and dogs. A good wind depends upon the heart as much as upon the lungs; the necessary adaptations occur unconsciously by practice.

The phenomena of second wind are best known to those who run or row rapidly over long distances. Experiment shows that during the dyspnea preceding second wind there is a larger pulmonary ventilation owing to the stimulating effect of the increase in the carbon dioxide and the decrease in the oxygen of the blood. With the advent of second wind the ventilation diminishes owing to a change in the opposite direction.

The cause of the stabbing pain in the side known as stitch is uncertain and is not easy to investigate, for the physiologist cannot insure its appearance at a suitable time. It may be due to a spasm or cramp of a small group of intercostal muscles or a part of the diaphragm. As the pain may occur on either side this negatives the idea that it is due to a spasm of the involuntary muscles of the spleen.

As a result of training the rate of the beating of the heart becomes slower during rest, this reduction in rate is accompanied by an increase in the force of the heart beat and the heart secures a longer period of rest between contractions. During severe exertion the rate of beat may be doubled or trebled in the well-trained man without any danger of collapse. There is in the trained man a more perfect co-ordination between all his organs, especially the muscles, heart, and lungs.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

HEART FIBRILLATION AND ELECTRIC CURRENT. *L. Haberlandt. Abstr. as follows from Wien. klin. Wchnschr., July 1, 1926, vol. 39, p. 774, in Jour. Am. Med. Assn., Sept. 18, 1926, vol. 87, p. 984.*

Prévost and Battelli discovered in 1899 the possibility of restoration of normal heart beat by high tension currents in animals in which they had induced ventricular fibrillation by irritation with faradic currents. Jellinek confirmed this and suggested to try in desperate cases of electric injury a very short application of the same current that had caused the apparent death. Haberlandt agrees with him, and would extend the indication as the very last therapeutic resort in the ventricular fibrillation due to other acute injuries (chloroform, great pain or fright). Ventricular fibrillation is best diagnosed by electrocardiography. Another symptom is a soft continuous murmur over the heart region, with absence of normal heart sounds.

J. I. H.
Aug., 1927

WOMEN AND CHILDREN IN INDUSTRY

PROTECTION OF FEMALE WORKERS. *Japan Letter, Jour. Am. Med. Assn., Dec. 11, 1926, vol. 87, p. 2012.*

The authorities have decided to consider miscarriages in and after the fourth month, among female workers in factories and mines, the same as ordinary childbirth. Consequently, the women will be given six weeks' rest after miscarriage, and will be allowed both the expenses of the illness and 60 per cent. of their wages during the confinement.—K. R. D.

WOMEN IN INDUSTRY AND THEIR SANITARY CONDITIONS (IN JAPAN). *G. Teruoka. Tr. Sixth Congress Far East. Assn. Trop. Med., Tokyo, 1925.*

More than one-half of the women in Japan have some occupation. Most of them, 62 per cent., follow agriculture; 14 per cent. follow industry; 9 per cent., commerce; and 6 per cent., domestic service. In 1922 there were 1,259,503 women employed in industry; of this number 756,153 were employed in dyeing and weaving factories, and 71,349 in mines. Nearly all the manufacture of raw silk textiles, and dyeing and weaving, which make up the Japanese export trade, is carried on by females, whose working conditions are less favorable than those of males; 200,000 of the females in these industries are under 16 years of age. Most of the dyeing and weaving factories (80 per cent.) work between ten and twelve hours a day. The majority of them also work all night, especially the reeling and spinning factories. The new law prohibiting work between 10 P.M. and 5 A.M. has not yet come into effect. Labor turnover, sickness, and unfitness among these women are high. The factory girls after leaving school fail to develop as rapidly physically as do other Japanese girls; their mental power also fails to develop. The law fixing the minimum age of employment at 16 has not yet been enforced. Most of the working women, 89 per cent., live in dormitories, as they have been brought to industry from various parts of the country. Mass nutrition for these young women is important; they obtain about 2,000 calories daily, but mice fed on factory food did not develop well; apparently it lacks in protein and vitamin B. Tuberculosis attacks these young females freely, who suffer from overwork and malnutrition. Beriberi also is endemic, with its height in the summer, when overstrain is greatest owing to the temperature at which work is done, often at 100°F. with a relative humidity of over 80 per cent. The author holds that a good social policy must be based upon biology rather than upon economics. These aspects of female labor in Japan are now coming into prominence.—E. L. C.

NURSERIES IN FACTORIES. *Japan Letter, Jour. Am. Med. Assn., Oct. 23, 1926, vol. 87, p. 1406.*

The metropolitan police investigated facilities for child care in ten factories employing 500 or more workers. Each nursery admits workers' children freely, except two of them in which children must pass a medical examination before admittance. The institutions may be divided into three classes, A, B, and C. A admits children from

100 days old to 3 or 4 years of age; B admits children from 4 years to school age; C combines A and B. The total number of children being cared for is 477 at present. The buildings are all of one story, light and clean, and well ventilated. The children in eight of them are given cakes, sweet potatoes, macaroni, and the like between meals twice a day. Lunches have to be paid for by their parents in six of them. In three, a medical examination is held once a week, twice a month, and once a month, respectively. A short time ago, the physician in one of them found many flatfooted children and cured them all by having them play outdoors in sand. The nurseries open at 5 or 7 in the morning and shut at 5 or 7 in the afternoon; this agrees with the work hours of mother workers. (Of course, mothers are allowed to nurse their babies during their rest hours.) The staff consists of nurses and assistant nurses, and each factory physician superintends them.

PHYSICAL DEVELOPMENT OF YOUNG WORKERS IN SWEDEN. *Abstr. as follows from Internat. Labour Rev., April, 1926, vol. 13, pp. 569–575, in Bull. Hyg., Dec., 1926, vol. 1, p. 979.*

All young persons in Sweden between age 13 (boys) or age 14 (girls) and age 17, inclusive, who are industrially employed are medically examined annually and the findings are entered in individual workbooks. Data have been extracted therefrom for the years 1913 to 1921 and published in a report,[1] extracts from which are quoted. For boys the annual increase in height is at a maximum between ages 14 and 15, in weight and chest measurement between ages 15 and 16. For girls, who develop physically earlier than boys, maximum growth occurs before age 14. The boys are lighter than girls until age 16, and do not equal them in height until age 15, but do not remain below them in chest measurement after age 14. In the original report the data are distributed by trades, but the results of this grouping are not quoted; those interested must refer to the original report.

[1] Sweden. Socialstyrelsen: Kroppsutvecklingen hos minderariga industriarbetare i Sverige. Sveriges officiella statistik, Socialstatistik. Stockholm, Norstedt, 1925, pp. 100.

REPORT ON AN ENQUIRY INTO THE PERSONAL CIRCUMSTANCES AND INDUSTRIAL HISTORY OF 3,331 BOYS AND 2,701 GIRLS REGISTERED FOR EMPLOYMENT AT EMPLOYMENT EXCHANGES AND JUVENILE EMPLOYMENT BUREAUX JUNE AND JULY 1925. *Ministry of Labour, pp. 80. H. M. Stationery Office, 1926. Abstr. as follows in Bull. Hyg., Dec., 1926, vol. 1, p. 975.*

An investigation is reported into the personal circumstances and industrial history of 6,032 juveniles, being 10 per cent. of those registered for employment on July 13, 1925, in England, Scotland, and Wales. The time chosen was one when a long spell of trade depression was claimed to be creating a rising generation of unemployed, and, for that reason, of unemployable persons. The sample chosen is probably largely representative of the whole unemployed body of boys and girls at that date; 28 per cent. were under 16, and 72 per cent. over 16; 70 per cent. were of good physique, 84 per cent. in good health; only 5.5 per cent. were of poor physique, and 2

per cent. in poor health. The great majority had attained at least Standard VI before leaving school; more than half obtained work within one month of leaving; and over half the situations were obtained unaided, while only 12.4 per cent. were obtained through employment exchange or bureau. About two-thirds of the juveniles had held their first post for more than six months, a fact which is against the idea that situations are left for sheer love of change. In general the worse the physique, health, or appearance, the longer was the average period of unemployment; a boy of poor physique being unemployed twice as long as one with good physique. No evidence was found of a large class verging on the unemployable in consequence of long-continued unemployment. A significant fact is the unsatisfactory character of much of the employment, which offered few or no prospects of training for a definite occupation; only 5 per cent. of first situations were apprenticeships, while of apprenticeships only 13 per cent. were documentary, the remainder being verbal understandings or trade practice.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

TWELFTH REPORT OF ADVISORY COMMITTEE ON ATMOSPHERIC POLLUTION: REPORT ON OBSERVATIONS IN THE YEAR ENDING MARCH 31ST, 1926. *H. M. Stationery Office, 1926, pp. 52.*

This report is divided into four sections and an appendix.

Section 1.—This section deals with the results obtained by the standard gauge in the collection of deposited matter. There have been twelve additional deposit gauges installed during the year, bringing the total number up to sixty-one. The gauges are now well distributed throughout England, Scotland, and Wales and are operated through the assistance of twenty-nine local authorities. Where new stations have been started, maps showing the position of gauges are given. The data obtained from these deposit gauges are presented in tables, one for each station. The results are given in grams per square dekameter (or metric tons per hundred square kilometers). The tables show the mean monthly deposit, winter and summer deposits, and the annual deposit for each station that has been in operation without interruption for the year. In addition, they contain the rainfall in millimeters, the insoluble matter (tar, carbonaceous matter other than tar, and ash) and soluble matter (sulphates, chlorine, ammonia, and ash). In a table comparing the mean monthly deposit for the year 1925 to 1926 with the corresponding figures for the five years' average, the number of stations which show a lower deposit than the average is greater than the number which show a higher deposit, in the case of every element of pollution given. The conditions also indicate improvement over those of the year 1924 to 1925. Other tables show (1) highest and lowest results for the general average and for the year, (2)

comparison of summer and winter deposits, (3) comparison of mean monthly deposits for summer (April to September) and winter (October to March) for the year 1925 to 1926.

Section 2.—This section gives the results obtained with the automatic filter at five different stations. These results are tabulated and graphically represented for hourly variations of suspended impurity, reduced to milligrams per cubic meter. Week days, Saturdays, and Sundays are treated separately. The days are also classified into two main groups: ordinary days and Z days, the symbol Z indicating days of smoke haze when the maximum reached or exceeded 1.28 mg. per cubic meter. Summer and winter results are also considered separately. Comparing these results with those of the previous year, two of the stations show an increase in the percentage of Z days, one shows no increase or diminution in the percentage of Z days, and two show the percentage of Z days to be noticeably less.

Section 3.—The jet dust counter has been described in a previous report. Little use has been made of this apparatus in England, but certain observations have been made, particularly on the effect of hygroscopic salts in the air on condensation. In a paper which Dr. Owens read before the Royal Society he inferred that, when a haze of hygroscopic salts exists in the air, a fog may result at humidities much below the saturation point. In this section are also given observations made in the United States by Kimball and Hand of the United States Weather Bureau with the jet dust counter, on suspended impurity and wind velocity and the relation between dustiness and visibility.

Section 4.—This section deals with the following "Sundry Researches" of the Committee:

1. Dust from furnace ash. A photomicrograph obtained from the ash of a rotary cement kiln shows the ash to be made up of light, hollow bubbles about 0.016 to 0.2 millimeters in diameter. This ash would have the capacity for traveling in air to much greater distances than would solid particles on account of its great displacement relative to weight. By treating the ash from a hand fired boiler, black, spherical particles were obtained that were much heavier and about one-half as large in diameter as the hollow particles.

2. Obstruction of ultraviolet radiation by smoke. An attempt was made to correlate the obstruction of ultraviolet radiation, as measured by the acetone blue method, with the quantity of suspended impurity in the air. Suspended impurity in the air during the period from sunrise to sunset on days when the sky was not more than one-quarter covered with cloud is plotted in milligrams per cubic meter against ultraviolet radiation.

3. Relation of tar deposit to total deposit. A short discussion with curves shows a relation between domestic smoke and industrial smoke.

4. Relation of sulphur deposit to total deposit. The summer and winter data for sulphur deposit covering the years from 1922 to 1926 are given in tabular form. In general, the sulphur seems to vary inversely with the total deposit, although this is not always true.

Appendix.—A new atmospheric de-

posit recorder is described and the results obtained with it are given as follows: results of hourly and daily observations; number of particles and weight of insoluble matter compared; influence of rainfall; influence of wind force; influence of wind direction; influence of rain and wind on Sundays; remarks; tables of observations.

The results obtained have been derived from observations in a manufacturing town where there are many boiler furnaces in operation. The curves represent data collected on 245 week days and 41 Sundays. It is interesting to observe that during the night period (6 P.M. to 6 A.M.) the same number of particles per square inch is collected whether it is a Sunday or a week day; in the period from 6 A.M. to 6 P.M., on the other hand, the number collected on a week day shows an excess over the number collected on Sunday.

It is regrettable that no national study on atmospheric pollution has been attempted in the United States. Now that smoke is regarded as a public nuisance and not, as formerly, as an evidence of industrial activity and prosperity, its control should be of interest to every community. As weather predictions by the United States Weather Bureau have proved their value to industry, so data on atmospheric pollution, obtained on a national scale by a governmental department, suitably financed, would undoubtedly result in suitable measures of suppression which would benefit the public health without interfering with industrial activity.—R. M. T.

CURIOUS ASPECTS OF ATMOSPHERIC POLLUTION. *J. S. Owens. Abstr. as follows from Gas Jour., 1926, vol. 176, pp. 372–373, in Chem. Abstr., Feb. 20, 1927, vol. 21, p. 619.*

Summary and discussion of various data concerning the smoke nuisance in England. A smoke fog (London) containing 1 mg. suspended matter per cubic meter is found to contain approximately 8,000 to 10,000 particles per cubic centimeter, and has a light stopping power of about 15 per cent. per 50 feet. A dense London fog may show as high as 100,000 particles per cubic centimeter. Deep breathing in polluted atmospheres is shown to be harmful by dust counts on inspired and expired air under various conditions of breathing.—P. D.

REPORTS OF THE COMMITTEE UPON THE PHYSIOLOGY OF VISION. I. ILLUMINATION AND VISUAL CAPACITIES. (A REVIEW OF RECENT LITERATURE.) *R. J. Lythgoe. Med. Res. Council, Special Rep. Series No. 104, pp. 80. H. M. Stationery Office, 1926. Abstr. as follows in Bull. Hyg., Dec., 1926, vol. 1, pp. 949–950.*

The body of the report summarizes the literature of the last dozen years on various problems of illumination and visual capacities such as the influence on visual acuity of different intensities and characters of illumination, factors in visual discrimination, the influence of glare, the speed of retinal impressions, discrimination of colors, visual fatigue. A final section deals with "methods and apparatus," and there is a valuable list of references to the works and authors quoted.

The condensation which compresses some 600 papers into fifty-five pages affords little scope for review, but much for admiration of the thorough-

ness and industry which it reveals. Certain indications may, however, be noted:

1. "The rise in visual acuity was rapid up to an illumination of five foot-candles, after which it became progressively slower and reached a maximum at about twenty foot-candles, although the improvement in the later stages was scarcely noticeable."

2. The speed of reading print on a rotating cylinder, lit from its interior, increased with increased illumination up to 10 foot candles for high-contrast type. That optimum also applied to independent tests of the speed of reading and naming numbers.

3. Visual acuity—and hence close work—is best served by monochromatic rays from the blue end of the spectrum, whereas distant objects are best seen in the more refrangible red-end rays and general detail is best brought out by white light combining all the spectral rays.

4. Some important observations regarding visual fatigue are recorded. While normal study under correct illumination can be continued for three or four hours with the eyes maintaining a practically constant efficiency, continuous intensive strain, *e.g.*, that of airship observers during an action, even in good weather conditions, produces signs of visual fatigue after thirty minutes. That fatigue is evidenced by lower visual acuity, afterimages, and inco-ordination of extra-ocular muscles.

IMPROVED LIGHTING AS A FACTOR IN ACCIDENT PREVENTION. *W. H. Rademacher. Safety Engin., Aug., 1926, vol. 52, pp. 78–82.*

This is a review of past progress in methods of industrial lighting with a brief analysis of accident hazards from improper lighting and a statement of the remedies which can be applied.—R. M. T.

FUME CONTROL IN THE VARNISH INDUSTRY. *K. J. Howe. Abstr. as follows from Am. Paint and Varnish Manufacturers' Assn., Circ. No. 297, 1927, pp. 31–38, in Chem. Abstr., Feb. 20, 1927, vol. 21, p. 658.*

A number of fume control systems in use are described.—P. D.

SCHOOL VENTILATION FROM THE VIEWPOINT OF THE SCHOOL ARCHITECT. *W. B. Ittner. Jour. Am. Soc. Heating and Ventil. Eng., March, 1927, vol. 33, pp. 119–127.*

This is an interesting and readable presentation of an architect's viewpoint on the present controversy in the United States on the relative merits and costs of mechanical versus window ventilation.—P. D.

THE CONTRIBUTION OF THE ENGINEERS TO COMFORT AND HEALTH. *E. S. Hallett. Jour. Am. Soc. Heating and Ventil. Eng., Feb., 1927, vol. 33, pp. 79–86.*

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

THE MEDICAL EXAMINATION OF CHAUFFEURS AND RAILWAY ENGINEERS. *Abstr. from Paris Letter, Jour. Am. Med. Assn., Oct. 30, 1926, vol. 87, p. 1492.*

A regulation has been proposed by the Academy of Medicine looking toward diminution of the number of accidents caused by mistakes of railway engineers and of chauffeurs, and

requiring them to undergo examinations as to their aptitude for their calling, not only when they enter on it but also every three years. A first examination at the beginning will not suffice, for the health of the examinee may change in time, under various influences, such as alcoholism. Diseases of the heart and kidneys must be watched; diabetes, frequent in railway engineers, may disturb the vision and even the color perception.

The proposed measures have encountered opposition from the railway engineers and the chauffeurs, themselves, and from the labor unions. The solution of the problem seems to lie in transferring workmen found incapable of performing a service in which public safety is involved to positions in office or workshop.—E. O.

Should a Railroad Hospital, Maintained Primarily for Railroad Employees, Treat Private Pay Patients? *R. H. McLeod. Texas State Jour. Med., Oct., 1926, vol. 22, pp. 400–405.*

Dr. McLeod believes "that the operation of an employees' hospital for the treatment of outside patients is not advisable, but, on the contrary, is unfair and is opposed to the best interests of the employer, the hospital staff, the outside local physicians, and the organization maintaining the hospital."

MALINGERING

Detection of Malingerers. *E. Török. Arch. Ophth., 1926, vol. 55, pp. 338–350.*

It is the author's experience that the vast majority of injured persons are honest and that a diagnosis of malingering should, therefore, be made only after a most careful and thorough examination and observation. He mentions several conditions which may, after a superficial examination, lead the physician to brand the patient as a malingerer although he is perfectly honest, and describes briefly his own methods of guarding against a false diagnosis.—M. C. S.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Factory and Workshop. Dangerous and Unhealthy Industries. The Vehicle Painting Regulations, 1926, Dated March 12, 1926. *Statutory Rules and Orders, No. 299, pp. 4. H. M. Stationery Office, 1926. Abstr. as follows in Bull. Hyg., Sept., 1926, vol. 1, pp. 733–734.*

These Regulations came into force on May 1, 1926, and are directed against the risks of lead poisoning. The Regulations shall not apply to (*a*) a factory or workshop in which not more than two persons are employed in painting; or (*b*) the occasional *painting* of a *vehicle* used *solely* in the business of the factory or workshop.

The definition of *vehicle* applies to

every description of wheeled carriage (including bodies and wheels made separately) used for the conveyance of persons and goods, or to any locomotive.

Lead paint is defined as any paint, paste, spray, stopping, filling, or other material used in *painting* which when treated in the manner described in the Schedule attached to the Regulations yields to an aqueous solution of hydrochloric acid a quantity of soluble lead compound exceeding, when calculated as lead monoxide, 5 per cent. of the dry weight of the portion taken for analysis.

Lead paint must only be kept in receptacles legibly marked "Lead." This requirement does not apply to paint while in actual use or while being mixed for immediate use. When lead paint is being sprayed, the operation must be carried out in a special compartment provided with an exhaust apparatus so fitted that the operator shall not stand between the fan and the article being sprayed.

A surface painted with lead must not be rubbed down by dry process. Débris is to be removed while yet wet or by a moist process. Raw white lead or sulphate of lead must only be manipulated where an exhaust is provided. This does not apply to instances where a worker is preparing material for his own use.

Meals are only to be taken in a specially provided apartment. Arrangements must be made for preventing the contamination of personal clothing by lead paint.

Lavatories with water, nail brushes, and soap must be provided. These may take the form of smooth troughs supplied with a constant supply of warm water from taps or jets at intervals of 2 feet. The trough must not have a plug, and 2-foot lengths of trough for every five persons employed at any one time must be afforded. Alternatively one lavatory basin for every five employed at any one time; each basin having a supply of hot water, waste pipe, and plug. If hot water is not laid down a supply must be made available.

When the Chief Inspector of Factories gives notice to an occupier that the incidence of lead poisoning is unduly heavy in a workshop or factory the occupier shall arrange that persons employed in painting works shall undergo periodic medical examination.

When required to do so, every person employed must present himself for medical examination. Overalls must be worn. These must be removed before the taking of food or leaving the premises. Every employed person must wash his hands. No food is to be introduced to premises where painting is carried on, nor must any food be stored or prepared therein.

THE PROJECTED LAW PERTAINING TO INDUSTRIAL ACCIDENTS, OCCUPATIONAL DISEASES AND HEALTH INSURANCE. *Belgium Letter, Jour. Am. Med. Assn., Nov. 20, 1926, vol. 87, p. 1756.*

This is an outline of a projected Belgian law pertaining to industrial accidents, occupational diseases, and health insurance, with a discussion of possible advantageous modifications. —K. R. D.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

THE TEACHING OF INDUSTRIAL MEDICINE. *T. Legge. Lancet, May 28, 1927, vol. 1, pp. 1115–1117.*

The foundations of industrial medicine are attributed to Thackrah and Chadwick 100 years ago, when arose the post of certifying factory surgeon. This post has been on a too narrow negative basis and should be made more positive. The claim is made that industrial medicine offers the greatest results on the clinical side; it is work for the general practitioner, rather than for the medical officer of health. Too little attention is paid in the medical curriculum to the influence of occupation on the health of those among whom the student will in the future have to practise. He is taught far too little concerning industrial disease and poisoning. He knows too little about compensation in regard to causation arising in occupation. Deaths caused by occupation are more frequently subjects for inquests, where his opinion will be asked, than are murder cases, concerning which he is taught much in lectures on forensic medicine. Industrial hygiene is dealt with, and that imperfectly, only in instruction for the Diploma in Public Health. Yet the medical officer of health has no opportunity of studying the effects of industry on living persons, nor does it fit in with his other duties; he should possibly control factory sanitation, but the clinical side of industrial hygiene should belong to the general practitioner, who should be trained to face these duties. At present adequate courses are not given in this country,

although one or two are given in America, notably at the School of Public Health of Harvard University.—E. L. C.

INDUSTRIAL HYGIENE ABROAD AND THE HYGIENIC EXPOSITION AT DÜSSELDORF. *G. M. Price. Am. Jour. Pub. Health, Dec., 1926, vol. 16, pp. 1202–1204.*

A brief survey is here given of the "Gesolei" (*Gesundheit, Soziale Fürsorge,* and *Leibesübungen*) Exhibition at Düsseldorf, Germany, in 1926. One of the groups at the exhibit embraced industrial hygiene under the subgroups: legislative basis for protection of workers, industrial physiology, industrial psychology, accident prevention, occupational diseases, and homework and work of women and children. The best subjects and objects from the various industrial museums of Germany were gathered and many new methods were presented; in the occupational diseases group, models were shown of practically all the occupational diseases and their etiology and prevention.—B. A.

THE MEDICAL INSPECTION OF LABOUR. *Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, pp. 80.*

This publication reports a meeting of medical inspectors of labor held at Düsseldorf, September, 1926. Short and useful descriptions are given, by the medical inspector present from each country, of the organization and method of work carried out by him and his staff. In this way the industrial medical service is described of Belgium, Great Britain, the Netherlands, Italy, Austria, Soviet Russia, Prussia, Germany, Bavaria, Saxony, and Baden. Naturally the scope of the work undertaken in each country varies with the extent to which that country is industrial. Having regard to this fact there appears to be greater uniformity of action displayed than might have been anticipated. The exception to this rule is Soviet Russia, where there are an unusually large number of medical inspectors—295 in January, 1926. The description, however, given by Professor Kaploun indicates that medical inspectors in Russia are expected to carry out a good deal of routine executive work, such as periodic examination of workers, which, in other countries, is performed by medical practitioners. Nevertheless interest attaches to seeing how, as the social structure is being rebuilt, industrial hygiene is being simultaneously developed in Russia.

As each of the short articles in the publication is in itself a summary, they do not lend themselves to abstracting.—E. L. C.

THE MEDICAL CONSULTANT IN INDUSTRY AND HIS VALUE TO THE STATE. *R. S. McBirney. Am. Jour. Pub. Health, Dec., 1926, vol. 16, pp. 1182–1185.*

For the small factories which have no medical officer and for the manufacturers encountering new health hazards or different working conditions, especially, the state should provide a bureau to which industrial accidents and diseases would be reported and which would act as a clearing house of information for the manufacturer and the industrial surgeon in

meeting their problems, through expert advice based on scientific research. The Bureau of Industrial Hygiene of the New York State Department of Labor is thus endeavoring to improve factory conditions for the health of the workers and to lessen the liability of the owners.—B. A.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

CANCERS OF THE POSTERIOR URETHRA AND PROSTATE IN WORKMEN IN CHEMICAL TRADES. *R. Oppenheimer. Abstr. from Deutsch. med. Wchnschr., Aug. 6, 1926, vol. 52, pp. 1342–1343, in Bull. Hyg., May, 1927, vol. 2, pp. 353–354.*

The author describes two cases and discusses the question whether cancers of the urethra and prostate in chemical workers may be of occupational origin.

Case 1. Tumour of the posterior urethra, found at operation to be invading pelvic fascia. Excision impossible. No microscopic examination. Patient died a year later; no autopsy. The man had worked for 28 years uninterruptedly in the *Ammoniakschmelze*[1] of a chemical factory. No further information is given about the substances with which he came in contact. Of the men, usually seven in number, who worked in the same room with him, two were said to have died of disease of the bladder during the preceding year.

Case 2. Patient who had been "since 1895" a laboratory worker, and was concerned customarily with aniline and its compounds, died soon after prostatectomy. Microscopic appearances, which are described fully, showed diffuse carcinoma of the prostate.

The author considers it possible that some tumors recorded as occupational cancers of the bladder have arisen in the posterior urethra and prostate; the differential diagnoses may be difficult and such patients are not always examined by experienced urologists. The question is of importance to the workmen as, under the existing law of Germany, chemical workers affected with tumors of the bladder can claim a certain pension after fourteen weeks' illness, but tumors of any other part of the urinary tract are not recognized as occupational. Oppenheimer proposes that tumors of the posterior urethra and prostate in chemical workers should likewise be persionable, provided (1) that the person has worked with substances recognized as dangerous for at least two years, and (2) that at least five years have elapsed between entry into the occupation and the appearance of a tumor.

SCHNEEBERG LUNG CANCER. *F. A. Weber. Abstr. from Arb. a. d. Reichsgsndhtsamte, 1926, vol. 57, pp. 179–188, in Bull. Hyg., May, 1927, vol. 2, p. 351.*

In the paper here abstracted Dr. Weber first gives an account of the literature relating to this disease, from Paracelsus in 1531 to Margarete Uhlig in 1920. In 1922 the Com-

[1] *Ammoniakschmelze* suggests the manufacture of beta-naphthylamine from beta-naphthol; to this process and to the production of the beta-naphthol required Curschmann (*Zentralbl. f. Gewerbehyg.*, 1920, vol. 7, pp. 145, 169) attributes ten cases of cancer of the bladder.

mittee of Cancer Research in Saxony undertook to reinvestigate the question. One hundred and fifty-four Schneeberg miners were examined by X-rays; in the next four years 21 of these men died, and in 13 of them carcinoma of the lung was found at autopsy, and lung tumor was suspected very strongly in 2 of the remaining 8 who were not examined postmortem. Three hundred and sixty-two persons from the same neighborhood, who were not miners, were also examined by X-rays, and no case suggesting the presence of a lung tumor was found among them. Eight Schneeberg lung tumors which were examined by Schmorl were carcinomata; no lymphosarcoma was met with. The lungs of the miners show pneumonokoniosis, due no doubt to stone dust from machine boring. The dust of the mine consists of very sharp edged particles, and contains arsenic in amounts from traces up to 0.45 per cent.; it is slightly radioactive, and the air of the mine strongly so.

ON OCCUPATIONAL CANCER WITH SPECIAL REFERENCE TO THE INDUSTRIES OF MALAYA. *A. N. Kingsbury. Abstr. as follows from Malayan Med. Jour., 1926, vol. 1, pp. 11–13, in Bull. Hyg., May, 1927, vol. 2, p. 354.*

The author reviews the subject of occupational cancer and discusses the possibility of cases arising in Malayan workers engaged in industries in which use is made of substances known to possess carcinogenic properties, *e.g.*, the tar used for road macadamizing purposes and creosote in the preservation of wood. In view of the fact that Malayan tin contains a considerable amount of arsenic, it is expected that the cancer investigation now in progress will show whether the tin mining coolies and workmen employed in the smelting works show a higher incidence of cancer than does the general population. As regards mineral oils and the forms of occupational cancer attributed to certain varieties of these, the author records an interesting case of epithelioma of the scrotum and right index finger occurring in a coolie who for three years had carried out extensive antimalarial oiling. Although three years is a short period for the development of occupational cancer, epithelioma of the scrotum is very rarely seen in Malaya, and a connection between the nature of the work and the nature and site of the tumors is inferred. He points out, however, that the probability of the eventual occurrence in Malaya of many cases of this type is small, as the coolie migrates "from one occupation to another according to the prosperity of the various industries," and exposure to the irritant over a long period is unlikely to take place. Furthermore, in the event of other cases arising it should not be difficult to devise suitable protection for the worker.

SCROTAL CANCER IN A TAMIL EMPLOYED ON ANTIMALARIAL OILING. *A. N. Kingsbury. Jour. Path. and Bacteriol., April, 1927, vol. 30, pp. 504–505.*

The man affected, though a dresser in a rubber estate hospital, had for the last three years carried out extensive antimalarial oiling on a rubber plantation. He was aged 44 years. During the process of spraying, the knapsack carrier often gets his clothes

saturated with oil. This collects in the regions of the groin and scrotum.

A tumor appeared on the distal phalanx of the right index finger and two raised nodules upon the scrotum. When excised, they were, on histologic examination, found to be squamous-celled carcinomata.

For this work the cheapest heavy oil which will flow in a cloud from the sprayer is used. In the present instance it came chiefly from Sumatra. Leitch has found that Borneo oil, which is obtained from a not very distant district, contains the carcinogenic factor.—R. P. W.

CIRCULATORY SYSTEM

IRRITABLE HEART AND TREATMENT. *G. H. Parmenter. Abstr. as follows from U. S. Vet. Bur. Med. Bull., Dec., 1926, vol. 2, p. 1127, in Jour. Am. Med. Assn., Jan. 29, 1927, vol. 88, p. 355.*

Irritable heart is a symptom-complex without definite pathologic changes usually found in persons who are below average in physical development, and resulting from unusual physical or mental strain. The method of treatment advocated by Parmenter combines relief of focal infection, rest for the purpose of increasing weight, graduated exercise, occupational therapy, and the psychology of encouragement. Sufficient hospitalization to obtain physical results is recommended. Prolonged hospitalization is avoided because of the tendency to chronic invalidism in these patients.

THE "DOCTOR'S HEART." *A. S. Hyman. Jour. Am. Med. Assn., March 5, 1927, vol. 88, p. 712.*

Examination of a group of 100 physicians with cardiovascular disease showed a high instance of extrasystoles but no great increase in blood pressures.

The types of heart disease discovered did not differ in any way from those found in other groups within the community. The author concludes that while it is true that cardiovascular disease is the greatest cause of death among physicians, the belief that there is a clinical entity known as the "doctor's heart" is without foundation.—K. R. D.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

COMMON GASES AND THEIR HAZARDS. *A. C. Fieldner. Nat. Safety News, June, 1926, vol. 13, pp. 25–28.*

Gas hazards may be divided into two principal classes: (1) hazards from inflammation and explosions; and (2) hazards from asphyxiation and poisoning. The best means of preventing accidents in the first group is by adequate ventilation and the avoidance of open light, flames, sparks, electric arcs, short circuit, and other sources of ignition. Ventilation is also the best preventive against asphyxiation and poisoning from toxic gases. "As a rule loss of life and property from gas hazards is due to ignorance of the properties and hazards of the gases commonly used and consequently failure to use proper protection." A table gives explosive limits of common combustible gases in air.

The specific hazards from the following are briefly discussed: carbon monoxide, carbon dioxide, natural gas, coal or coke-oven gas, blue water gas, coke producer gas, blast-furnace gas, automobile exhaust gas, gasoline and petroleum vapors, coke-oven light oil or benzol, gas hazards in street manholes and sewers, compressed gases used in cutting and welding, compressed oxygen and oil, compressed oxygen and combustible gases, gases used in refrigeration, hydrocyanic acid gas, and chlorine. The paper concludes with a short section on respiratory appliances.—J. W. F.

INDUSTRIAL CARBON MONOXIDE POISONING AND ITS PREVENTION. *W. Heubner and Forstmann. Beihefte z. Zentralbl. f. Gewerbehyg., vol. 1, no. 4, pp. 55.*

The first section, "Industrial Carbon Monoxide Poisoning," by W. Heubner (pp. 1–20), is a review of current knowledge of carbon monoxide poisoning, considered especially from the physiologic point of view.

In the second section, "Concerning Apparatus for Protection against the Inhalation of Gases" (pp. 21–45), Forstmann gives a review, from a technical standpoint, of protective apparatus against the inhalation of toxic gases, especially carbon monoxide, and of apparatus for the resuscitation of persons poisoned by carbon monoxide.

The third section, "A Filter Apparatus for Protection against Carbon Monoxide," by K. Wollin (pp. 46–49), is a description of a simple filter apparatus for protection against carbon monoxide.

The remainder of the report (pp. 50–55) is devoted to a discussion.—K. R. D.

THE ESTIMATION OF CARBON MONOXIDE IN THE AIR OF WORKSHOPS. *F. Schoofs. Jour. State Med., Oct., 1926, vol. 34, pp. 575–577.*

In cases of fatal carbon monoxide poisoning, quantitative determinations for carbon monoxide in the blood should be made as well as tests for detecting its presence.

In the blood of three workmen who died after accidental absorption of large quantities of toxic gases, the author found the carbon monoxide coefficient to be greater than 0.5, showing that 50 per cent. of the hemoglobin passed into the state of carboxyhemoglobin.

In gas analysis methods where pyrogallol is used in order to remove oxygen, allowance must be made for the fact that appreciable quantities of carbon monoxide may be produced under certain conditions from the reagents. A considerable excess of alkali must be present in order to avoid errors.—B. A.

AMBLYOPIA CAUSED BY INHALATION OF CARBON MONOXID GAS. *W. R. Murray. Minnesota Med., Oct., 1926, vol. 9, pp. 561–564.*

Cases of blindness following carbon monoxide poisoning which have been reported in medical literature since 1921 are briefly reviewed.

Report of a case coming under the author's observation is given. A man, aged 24, a farmer, on the day previous to the onset of blurred vision, was exposed to exhaust gas of a gasoline motor for two hours while working in his garage. He had had similar exposures on several previous occasions. Onset of blurred vision in the right eye, and two days later in the left eye, was accompanied by the appearance

of a yellow spot, which later changed to a darker blurred area in the field of vision, which in both eyes appeared to have a revolving yellow halo around the periphery. Patient had diplopia at times, some nausea and vomiting, and headache.

Examination of the eyes two weeks after vision became impaired, when patient was admitted to hospital, and subsequent examinations showed the following:

Bulbar and palpebral conjunctivae mildly injected; external ocular muscles normal; no ptosis and no nystagmus. Pupils were irregular; right pupil larger than left with sluggish reaction to light. Intraocular media clear. There was bilateral papilledema, contraction of the retinal arteries, and dilated veins. The retinae presented a diffuse, grey-white opacity which extended uniformly throughout the fundus and was but slightly elevated; there was a retinal edema present. Vision was failing rapidly and he was able to distinguish moving objects but was unable to recognize individuals. When he left the hospital one week later, his vision was reduced to the perception of hand movements before right and left eyes. A few weeks after the patient left the University Hospital, he was examined by Dr. F. E. Burch, who found retinal edema and large massive vitreous exudates present. Vision at that time was perception of light. May 15, 1926, fifteen months after the onset of the eye involvement, this patient was re-examined by Dr. Burch and also by the writer. Ophthalmoscopic examination showed extensive chorioretinal lesions, without pigment, scattered throughout the fundus, and opacities in the vitreous. Vision in the right eye equalled 10/200, left eye equalled 2/200.

—B. A.

THE DETERMINATION OF MINUTE QUANTITIES OF LEAD. *A. Necke, P. Schmidt, and M. Klostermann. Deutsch. med. Wchnschr., Oct. 29, 1926, vol. 52, pp. 1855–1856.*

What is claimed to be a new method for detecting small amounts of lead in organic material is described. It is said to give reliable results for as small a quantity of lead as 0.01 mg., and even 0.005 mg. can be detected. The method relied upon is colorimetric and depends upon the blue color given when metallic dioxides react with tetramethyldiamidodiphenylmethane. Any lead present in the organic material has first to be carefully converted into lead dioxide: The lead is first precipitated with hydrogen sulphide, then the lead sulphide is filtered on an asbestos filter, from which it is dissolved in nitric acid, and finally oxidized with sodium hypochlorite. The lead dioxide obtained in this way is used for titrating against a standard amount of the tetramethyldiamidodiphenylmethane. Throughout the process care must be taken to use reagents which are entirely free from all traces of lead. As a check for qualitative purposes, the spectroscope is used; the lead dioxide obtained by the process just described is used in the flame for the spectroscopic examination. Illustrations are given showing spectrographs of lead present in specimens taken from (1) a guinea-pig, to which 10 mg. of lead nitrate had been administered by intravenous injection two hours before death, (2) a foundry worker with exposure to lead dust, and (3) an agricultural laborer. The method indicated the presence of lead in the first two cases, varying from 0.06 to 3.5 mg.; the lead bands in these cases are distinctly shown in the illustrations. In the third case no lead was found, nor are any lead bands to be seen in the spectrograph.—A. J. C.

A Critical Study of the Red Blood Picture in Lead Poisoning Following Different Methods of Demonstrating Stippling. *H. Brückner and R. Spatz. Arch. f. Hyg., 1926, vol. 97, pp. 277–298.*

The authors have developed a method of estimating the average number of modified red cells in a given field. Using fields having a standard degree of magnification it was possible to reduce the errors of observation to ± 10 per cent. The number of basophilic erythrocytes varies according to the method of staining in the following sense: Setting a value for the Manson-Schwarz method at 100, the Manson (borax) method has a value of 85, methylene blue 70, azur II 60, and Giemsa 40. This variation indicates a different type of staining. As a result of their study the authors conclude that the most suitable methods of staining are the azur II and the Manson-Schwarz. Azur II has the advantage of greater uniformity in staining; the Manson-Schwarz method has the advantage of greater quantitative efficiency.—L. T. F.

Basophilic Stippling in Moscow Typographers in the Year 1923 to 1924. *B. Kojranski. Zentralbl. f. Gewerbehyg., Jan., 1927, N. S. vol. 4, pp. 6–11.*

The blood of 512 typographers was examined for stippling. Basophilic granulation was found in 13.3 per cent. of the cases. Azur II, Giemsa, or Manson staining was followed, not less than two films being examined in each case. The results were examined statistically for various groups of workers. The author's findings are in agreement with various other investigators that basophilic granulation is definitely one of the signs of lead absorption.—L. T. F.

DUST HAZARDS AND THEIR EFFECTS

Pneumonokonioses. *Denet-Kravitz. Rev. Belge de la Tuberc., March and May, 1926.*

A short summary is given of the position of lung diseases caused by dust; for the most part the author relies upon British work. The main value of the contribution is a series of eighteen reproductions of radiographs. These gain through being given in pairs referring to the same worker in a dust industry at two-year intervals. The industries chosen are sand blasting and grinding of metals, and also exposure to the dusts of lime and of wood. As so frequently happens with this type of illustration, the text is required to explain the illustration, rather than the illustration to illuminate the text. Interest attaches to noting that the pictures, when the worker has been exposed to some dust like that of wood, exhibit in some instances shadows similar to those usually associated with exposure to silica dust. Clearly the position with regard to interpretation of the shadows detected by X-ray has yet to be defined.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

A Bill to Regulate Offices and the Employment of Young Persons Therein; and for Other Purposes Connected Therewith. *Offices Regulation Bill 33, pp. 11.* [*16 Geo. 5.*] *H.M. Stationery Office, 1926. Abstr. as follows in Bull. Hyg., Sept., 1926, vol. 1, pp. 734–735.*

[This is a far-reaching Bill which seeks to bring offices into line with workshops. It will inevitably provoke discussion. In some districts a systematic inspection of offices will necessitate additions to the existing administrative machinery.]

It is proposed to regulate all offices in respect of cleanliness, ventilation, overcrowding, painting, the maintenance of equable temperatures, and the provision of adequate sanitary conveniences.

[It will be when old properties, or out-of-date offices, are inspected and found wanting that the recommendations embodied in the Bill will cause disagreements and disputes.]

Provision for fire escape must be made. The air of offices must be changed twice hourly, and 600 cubic feet of air space allowed for each one employed. Where an office is occupied continuously by day and night, or with intervals not exceeding nine hours in any twenty-four hours, the allowance per head must be 1,200 cubic feet. Where the floor of the office is 5 feet below the level of the adjoining footway or street, 1,200 cubic feet must also be provided. Underground offices are not to be sanctioned after July, 1930. The Sanitary Authority must be satisfied regarding the adequacy of lighting, ventilation, sanitary provision, and construction of existing underground offices. The occupier is given the right of appeal, within twenty-one days, against the decision of a Sanitary Authority. Also the apportionment of costs of reconstructions, should such be found necessary, may be made the subject of appeal with a view to the allocation of expenses between owner and occupier. Sanitary conveniences and lavatories for males and females must be in the ratio of one for every fifteen or under that number employed. No person under 16 years of age is to be employed in an office and no young person is to be employed longer than four continuous hours, without an interval of at least one hour for meals. Young persons must not be employed at night, nor on Sundays. Every occupier must notify the Sanitary Authority within three months of the passing of the Act as to name, address, nature of work, and numbers engaged in the office. An abstract of the Act is to be fixed at the entrance of every office, or any other place indicated by Sanitary Authority. Every occupier is to keep a register showing the numbers of the young persons employed, particulars about office cleansing and any other matters prescribed by the Ministry of Health, who may call for returns regarding the numbers of young persons employed. Powers of entry are granted to officers of the Sanitary Authority.

The Act, if passed, is to be appli-

cable to England and Wales, London and Scotland.

THE NEW LAW PERTAINING TO OCCUPATIONAL DISEASES. *Belgium Letter, Jour. Am. Med. Assn., May 22, 1926, vol. 86, pp. 1638–1639.*

A new type of service in factories has been organized, which is intended more particularly for industries in which toxic substances such as lead and zinc are handled. It includes the installation of sanitary equipment and supplies, and a complete medical service. No charge will be made for the use of the equipment. The heads of industries will intrust the regular inspection of employees and the sanitary equipment of their factories to physicians approved by the minister of labor. They will keep a register showing the names of workmen who have been absent on account of sickness; also the dates and the duration of such absences. The physicians will inspect the sanitary condition of the factory equipment at least once a month. They will question (without compelling them to leave their posts) those workmen who appear to be failing in health. After each of their inspections, the physicians will make a written report of observations in special registers, but will exclude information involving professional secrecy. On their general visits, the physicians will examine more particularly: (1) workmen who present symptoms that may be due to occupational disease; (2) workmen who show recurrence of such symptoms in two months after the symptoms have been made to disappear; (3) workmen who have been absent from work on account of sickness, since the last visit of the physician; (4) workmen whose health appears doubtful, and (5) workmen who request such examination. They will record their findings on cards to be supplied by the heads of industry. The employers will, through their physicians, institute a general revision of the personnel of their establishments whenever they are requested so to do by the chief inspector of mines, or by the medical inspector of labor. The employers or managers will pay all the costs of medical inspections, and deductions will not be made from the wages of workmen for loss of time incurred by such inspections. Records will be preserved for at least five years. The registers will be open to examination by government inspectors charged with the execution of the law.

The law contains also provisions pertaining to general hygiene and industrial organization. For the better taking of samples of fumes and residual gases, shuttered openings will be provided at easily accessible points in the walls of chimneys or other conduits for the evacuation of fumes. Devices will be installed to carry off fumes, to dilute the gases thrown off by the ovens, and, as far as possible, to effect the condensation of harmful material.

WORKMEN'S COMPENSATION IN THE UNITED STATES. *R. H. Blanchard, Internat. Labour Office, Studies and Rep., Series M (Social Insurance) No. 5, 1926, pp. 103. Abstr. as follows in Bull. Hyg., Nov., 1926, vol.1, p. 916.*

The rise and present position of workmen's compensation law in the United States is set out. The position is highly complicated as there are forty-six Acts, including federal Acts and Acts confined to separate states; while six states have no Acts, and maritime employment and interstate commerce are not covered. The existing Acts, which for the most part only cover accidents, differ widely; some are niggardly, others liberal. A definite standard of legislation for the United States cannot be said to exist. The scope as well as tendencies of the different Acts is stated. Nine Acts cover occupational diseases generally or in part. Examination of the diseases scheduled for this purpose discloses a tendency for the different states to copy somewhat uncritically the schedule of the British Act; the only new diseases detected are poisoning with wood alcohol, brass, or zinc. Details

are given of the comparative benefit cost of the various laws, which is highest in the state of New York and lowest in Vermont with 52 per cent. of the cost in New York.

WHAT IS WRONG WITH OUR WORKMEN'S COMPENSATON LAWS AND WHAT WE CAN DO TO CORRECT THEM. *A. F. McBride. Jour. Med. Soc. N. J., Sept., 1926.*

Dr. McBride traces the history of the operation of the workmen's compensation law in New Jersey.

In 1919 the weekly maximum compensation was raised from $10 to $12, the minimum from $5 to $6. These amounts have been raised at various times during the past five years until at the present time the maximum is $17, the minimum $8.

The waiting period has several times been reduced: in 1919, to ten days, and, effective Jan. 1, 1926, to seven days.

The contraction after July 4, 1924, of anthrax, lead poisoning, mercury poisoning, arsenic poisoning, phosphorus poisoning, wood alcohol poisoning, benzine poisoning, chrome poisoning, caisson disease, or mesothorium or radium necrosis, as the result of exposure during employment, causing a disability commencing within five months after the termination of such exposure, entitles the employee to the benefits of the Compensation Act, provided due notice is given to the employer or provided the employer has actual knowledge of this disability within the above-mentioned five months.

The employer is not held liable to furnish or pay for medical service in excess of $50 and in addition to furnish hospital service in excess of $50 unless the workman or his physician or representative files a petition with the Workmen's Compensation Bureau. If so requested by his employer, the employee, after an injury, must submit to examination by a physician authorized to practice under the laws of the state. A physician of the employee's choice may participate in the examination.

INDUSTRIAL LIABILITY FOR CANCER. *A. R. Kilgore and C. E. Smith. Abstr. as follows from Calif. and Western Med., July, 1926, vol. 25, p. 70, in Jour. Am. Med. Assn., Sept. 25, 1926, vol. 87, p. 1066.*

It has become the practice of commissions to hold occupational injury responsible for cancer under certain conditions. These conditions have been laid down and generally accepted by authorities, and compensation should be awarded as the conditions are or are not fulfilled in individual cases. Kilgore and Smith insist that insurance carriers should protect themselves as well as the employee by insisting on repeated examination after the immediate effects of trauma have cleared up in all cases of injury of a type likely to result in cancer. If cancer is demonstrated as soon as the swelling or contusion has gone down, the inference of preexisting cancer can be made and the injury absolved from responsibility for starting the growth. On the other hand, if cancer does develop it may be found early enough to make surgical cure possible. These considerations are especially applicable to the breast.

TRAUMATIC NEUROSIS. *M. Kollmann. Abstr. as follows from Deutsch.*

med. Wchnschr., Oct. 22, 1926, vol. 52, p. 1814, in Jour. Am. Med. Assn., Jan. 22, 1927, vol. 88, p. 284.

Kollmann deals with the legal aspects of so-called traumatic neuroses. He quotes decisions of the German superior courts, which refuse to admit the injury as cause of the hysteria. The wish to obtain indemnity—not the injury—is responsible for the symptoms. He is opposed to any compensation in such cases.—K. R. D.

THE LOSS OF ORIENTATION IN INSURED WORKMEN: ITS ECONOMIC ASPECT. *P. Dunn. Abstr. as follows from Lancet, July 10, 1926, vol. 2, pp. 66–67, in Bull. Hyg., Nov., 1926, vol. 1, p. 914.*

A man after convalescence from the enucleation of an eye is puzzled by a symptom which is new to him; he finds on pouring out a cup of tea much of it falls outside. For the time he has lost the faculty of orientation. The duration of the disability is generally a question of age; it usually varies between three and six weeks in young adults, but in older people the period is longer.

As a matter of expediency no one-eyed man should be permitted to resume his employment until accurate orientation has been reestablished. For example: A bricklayer will probably lay his bricks out of line, or he may make a misstep in using a ladder; a riveter is liable to miss the rivet with the hammer and so may injure his assistant.

From the economic point of view the workman, so long as the loss of orientation continues, is confronted with an impairment of his earning capacity apart from the loss of his eye; neither he nor his employer can rely on the accuracy of his work. Under such circumstances what is the position of the insurance companies? The disability has arisen indirectly as the result of an accident in the course of employment and the weekly wage compensation must be continued until orientation has been restored. Should the loss of orientation prove to be permanent, the insurance company concerned will find itself in an unenviable position. In all cases in which a workman loses an eye in the course of his employment this contingency arises, but the only consolation to be derived from its consideration is the rarity of the occurrence of the permanent loss of orientation. When the two eyes differ in refraction, one being better than the other, the better eye becomes the working or "master" eye. If the working eye be removed, the probability of the loss of orientation persisting or becoming permanent is greater than is the case if the less efficient eye has been enucleated.

Loss of orientation in an insured workman with only one eye cannot be excluded as a factor of importance under the Workman's Compensation Act. If permanent as a disability, it adds to the claim in settlement for the loss of an eye inasmuch as it reduces the working and earning capacity of the workman apart from the loss of binocular vision.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

CONCERNING A NEW CAUSE OF CARBON MONOXIDE POISONING, OFTEN INDUSTRIAL. *F. H. DeBalsac, E. Agasse-Lafont, and A. Feil. Presse méd., April 27, 1927, vol. 35, pp. 529–530.*

Risk of poisoning by carbon monoxide occurs in various insidious ways. The authors draw attention to yet another source of danger due to the manufacture and use of *"gaz pauvre."* This gas is made by distilling wood or wood charcoal, and contains from 25 to 27 per cent. of carbon monoxide, and from 4 to 8 per cent. of hydrogen. Sometimes it is enriched by the addition of water gas, which contains from 30 to 32 per cent. of carbon monoxide, and from 10 to 12 per cent. of hydrogen.

The authors investigated closely the conditions under which this gas is made, and conclude that, apart from unexpected accidents, little risk occurs to those employed, except during the cleaning of the apparatus used, or from the occurrence of leaks. They found that where men were exposed to the inhalation of this gas, they suffered from definite symptoms attributable to chronic carbon monoxide poisoning, namely, pallor, giddiness, weakness in the legs, vertigo, and throbbing headache. The conclusion is arrived at that while there is risk, it is not sufficiently acute to call for prohibition of

the gas. But special precautions should always be taken to insure that leaks from pipes used for its distribution shall not escape attention.—E. L. C.

CARBON MONOXIDE AND HYGIENE. *E. Kohn-Abrest. Ann. d'hyg. pub., indust. et sociale, 1927, vol. 5, pp. 213–223.*

The author holds it dangerous to concur with those who consider that an atmosphere containing 1 part of carbon monoxide per 1,000 parts of air cannot cause death because the coefficient of poisoning does not rise as high as 0.66. The coefficient of poisoning is concerned with the proportion of hemoglobin placed out of action by being united with carbon monoxide. Eighty cases are quoted, in half of which the coefficient was below 0.6, and in eighteen even below 0.5. Various other conditions, such as strenuous exercise, a diminution of oxygen, or an excess of carbonic acid in the air, or some pathologic state may render quite low coefficients dangerous. A proportion of 20 per cent. of carboxyhemoglobin is fixed as the limit which can be harmlessly endured for prolonged periods. The opinion held by many authors that chronic poisoning from carbon monoxide cannot exist, is controverted; and a syndrome embracing anemia, weakness, and troubles of vision, memory, and digestion, associated with habitual exposure to small doses of carbon monoxide, is held to represent chronic poisoning. The danger arising in streets and in garages from carbon monoxide in exhaust gases from motor cars is stressed, and an investigation is promised into the condition of the air of Paris in this respect.—E. L. C.

A NEW TEST METHOD OF CARBON MONOXIDE HEMOGLOBIN. *S. Kishi. Abstr. as follows from Tokyo Iji-Shinshi (Tokyo Med. News), July, 1926, no. 2475, in Japan Med. World, 1926, vol. 6, pp. 286–287, and in Bull. Hyg., April, 1927, vol. 2, p. 318.*

The test proposed is a color one. Red cells suspected of containing carbon monoxide are absorbed on filter paper which is then dried. A solution has previously been made in the following way: (1) 0.3 gm. of uranium acetate is dissolved in 20 c.c. of distilled water; (2) 130 c.c. of saturated potassium chlorate in 2.5 per cent. of hydrochloric acid is prepared. These two solutions are mixed and distilled water is added to bring up to 200 c.c. This reagent mixture is then boiled and poured into a test tube containing the dry filter paper on which the red cells have been absorbed. If carbon monoxide hemoglobin is present, a deep brownish-black, or reddish-brown color appears.

TREATMENT OF CARBON MONOXIDE POISONING IN A CHAMBER OF VARYING PRESSURE. *L. Schmidt. Abstr. as follows from München. med. Wchnschr., Dec. 24, 1926, vol. 73, pp. 2200–2201, in Bull. Hyg., April, 1927, vol. 2, pp. 318–319.*

The treatment is based on the fact that in carbon monoxide poisoning the hemoglobin is unable to carry oxygen to the tissues and that by means of artificial respiration the oxygen in the blood plasma can be very much increased by pressure and dis-

tributed to the body, while the hemoglobin recovers its normal condition. So far the treatment has only been applied to animals, but the success obtained has been sufficient to encourage its use on man. The apparatus (illustrated) consists of an air tight chamber of about 25 liters' capacity with an observation window and outside manometer; into this chamber oxygen is introduced by means of a motor driven pump, the pressure being raised to 2.3 to 2.65 atmospheres. The pump piston works at 16 strokes a minute, and the varying pressure on the thorax causes artificial respiration. Cats were used for the experiments. They were first poisoned with illuminating gas till apparently dead and then within a few minutes put in the chamber, where in two to three minutes they became lively, breathed quite normally and completely recovered. The control animals died or recovered very slowly. The carboxyhemoglobin, by taking oxygen from the blood plasma, becomes quickly converted into oxyhemoglobin.

With man the period of apparent death is much longer than in animals, and up to twenty hours has been observed. Further investigations have to be made before recommending the treatment for use on man. An experiment by Bornstein is quoted in which he endured a pressure of 3 atmospheres of pure oxygen for forty-eight minutes without any ill effects and in another experiment only noticed slight spasmodic movements of the legs at fifty-one minutes, but on coming out of the chamber he could walk quite well. There was no threatening of caisson disease. The author is taking steps to construct a chamber for human treatment.

MENTAL SEQUELAE OF CARBON MONOXIDE POISONING, WITH REPORTS OF AUTOPSY IN TWO CASES. *E. A. Strecker, A. E. Taft, and G. F. Willey. Arch. Neurol. and Psychiat., April, 1927, vol. 17, pp. 552–554.*

The pathologic report of the two cases is as follows:

Gross examination revealed no specific changes on the outer surfaces of either brain. In case 2, there was considerable atherosclerosis of the basal vessels. In case 1, frontal sections showed small softened areas in the globus pallidus on both sides. The corpus dentatum on both sides also was degenerated. There was general hippocampal atrophy with a consequent wide space about the crura.

The significant microscopic observations were similar in the two brains, and varied mainly in degree. In case 1, the softened areas, seen grossly, appeared as broken down tissue infiltrated with large, compound granule cells. There were also many miliary softenings found only in this specimen, which was from the case of longer duration. In case 2, changes in the basal gray matter were present, but had not gone on to cystic softening.

The most outstanding alteration was present in the white substance throughout, in which there was diffuse infiltration by various types of glia elements, mainly large, protoplasmic forms, and focally, many endothelioid cells of the compound granule type, which were shown by the scharlach R. stain to be filled with fat. These fat laden cells appeared in perivascular spaces as well as interstitially. The alterations in this type of poisoning are generally considered as due to anoxemia, since carbon monoxide is said to have 200 times greater affinity for hemoglobin than oxygen. Changes in the globus pallidus in carbon monoxide poisoning have been recognized for a long time.

The diffuse reaction in the white substance has been reported seldom. It is apparently the result of a severe alteration in the myelin; a definite myelinopathy, which leads to marked disturbance of function and, when sufficient in degree, is unrecoverable.

Report of a similar case has been made recently by Grinker, in which he characterizes this lesion of the deeper white matter as extraordinary and interesting.

CHANGES IN THE BRAIN IN CARBON MONOXIDE POISONING. *W. Weiman. Ztschr. f. d. ges. Neurol. u. Psychiat., Oct., 1926, vol. 105, p. 213.*

CASE OF DEATH FROM CARBONIC GAS. *Gerbis. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 73.*

"This case was that of a locomotive driver in a mine. The illness began during working hours and ended within ten hours in death with pulmonary oedema. The experts had diagnosed carbonic oxide poisoning, but one of them rejected this diagnosis, the symptoms being incompatible. In the course of a subsequent investigation it was ascertained that the briquettes of coal were piled in iron containers on both sides of the boiler and were frequently heaped upon the boiler itself and that they became very hot and sometimes caught fire. It is believed that spontaneous ignition brought about slow combustion of the sulphurous briquettes, and that the death of the driver was due to breathing sulphurous gas, principally sulphuretted hydrogen and carbonic oxide. The clinical study of the disease and the autopsy confirmed this hypothesis."

A CONTRIBUTION TO THE STUDY OF ETHYLENE TRICHLORIDE POISONING. *M.-F. Carrieu. Rev. d'hyg., May, 1927, vol. 49, pp. 348–361.*

This contribution calls attention to an industrial hazard previously reported by the same author (*Presse méd.*, Sept. 22, 1926, vol. 22, p. 1199). Ethylene trichloride is made as a by-product on vineyards from grape pips. The pips are crushed and dried, after which the powder is treated for the extraction of ethylene trichloride and oil containing it. The apparatus in which the extraction is carried out is normally kept sealed. But if a worker has to enter a still, he is exposed to serious danger if the contents, ethylene trichloride, is not covered by the water seal.

The author subjected animals (mice, rats, and guinea-pigs) to an atmosphere containing an excessive amount of ethylene trichloride fumes. The animals were rapidly anesthetized, and, if not withdrawn from the atmosphere, died. The liver, spleen, and, in particular, the kidneys and lungs were found acutely congested. Attempts to produce chronic poisoning by short exposures carried out over many days failed. But skin lesions were produced somewhat similar to the burns which occur among workers. Clothes exposed to the fumes absorb the ethylene trichloride and will produce these burns; hence clothing should always be removed from a worker upon whom artificial respiration is being performed after removal from a still. Workers in places where ethylene trichloride is produced should be warned of the dangers to which they are exposed, and they should be provided with

suitable masks before they enter a still.—E. L. C.

THE AROMATIC NITRO AND AMINO BODIES AS BLOOD POISONS. *W. Lipschitz. Zentralbl. f. Gewerbehyg., Jan., 1927, N. S. vol. 4, pp. 11–14.*

This is chiefly a review of the present knowledge on the subject.

A HITHERTO UNSUSPECTED SOURCE OF ARSENIC IN HUMAN ENVIRONMENT. *R. E. Remington. Jour. Am. Chem. Soc., June, 1927, vol. 49, pp. 1410–1416.*

This article is summarized as follows:

Samples of American smoking and plug tobacco have been examined for arsenic, and found to contain from six to thirty parts per million, or from 0.05 to 0.27 grain of arsenic trioxide per pound.

Approximately half of the arsenic in pipe tobacco is evolved in the smoke, and about half of that in plug tobacco is soluble in water.

Amounts of arsenic reported are much in excess of the maximum permitted by state and Federal authorities in foods, and of the amounts normally present in plants and animals.

—P. D.

A CASE OF POISONING CAUSED BY ARTIFICIAL RESIN. *Kranenburg. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 74.*

"The symptoms observed in a worker on artificial resin (*Bakelite*) appeared gradually and consisted principally in derangements of the central nervous system, headaches, lethargy, and loss of appetite.

"Artificial resin is a solid, hard, infusible substance produced by condensation of phenol and formaldehyde. In the course of turning and polishing a very fine dust is produced which floats in the air and has a perceptible odour of phenol.

"In the laboratory of the Factory Inspection Service at The Hague it was discovered that this dust when heated in water gives off free carbolic acid from a temperature of 15°C. The heat caused by turning explains the odour of phenol. When the very fine dust reaches the pulmonary cells the phenol may pass into the blood. With Becher and Litzner, who discovered free carbolic acid in the blood, it may be admitted that its passage into the *Liquor cerebri* sets up toxic action on the ganglionic cells. In the case cited the haemoglobin content was 75 per cent.; urine could not be examined.

"The patient then changed his occupation."

DISEASES CAUSED BY ATROPINE AND EMETINE. *Krüger. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, pp. 74–75.*

"A hitherto unknown form of dermatitis (according to the opinion of a specialist) has been discovered, affecting workers in a chemical factory. . . . .

"The eruption appeared on the hands, arms, neck, and face of patients, and they also complained of headache, restlessness, insomnia, and fever, which compelled them to stop work. The symptoms persisted for some time after the cessation of work.

"Investigation showed that this

dermatitis appeared in workers employed in the manufacture of alkaloids (atropine, emetine, and veratrine) and that emetine was the principal cause of the disease; the symptoms described appeared in workers who handled emetine alone.

"The workers manufacturing atropine also showed a maximum dilatation of the pupil and were unable to read after work; in some cases there was also dryness of the mouth and attacks of dizziness.

"In order to complete the investigation and prevent the appearance of hitherto unknown injuries to the health of the workers, Dr. Krüger ordered a periodical medical examination of the workers, which unfortunately did not give precise results because the factory ceased to manufacture emetine."

A Case of Industrial Poisoning by Barium. *F. Kipper. Abstr. from Aerztl. Sachverst. Ztg., 1926, vol. 32, p. 71, in München. med. Wchnschr., Dec. 17, 1926, vol. 73, p. 2180.*

A worker who had been employed for several days in crushing barium peroxide—a very dusty process—became ill with gastralgia, vomiting, dyspnea, and paralysis of the right arm and leg. His heart action was accelerated, and his pulse was very tense. Increasing dyspnea and cyanosis led to death on the third day. Postmortem examination failed to disclose the real cause of death; the light red color of the death spots was striking. The decision was made that the worker died of industrial barium poisoning. The dust, a large amount of which was found at the mill, contained 14 per cent. of barium oxide and 38 per cent. of barium carbonate. The hydrochloric acid of the stomach changed the barium carbonate, which is practically insoluble in water, to the chloride which is easily soluble and absorbed. According to the author's animal experiments, the carbonate is also absorbed in the lung. In barium poisoning the chief effects are due to absorption: first there are signs of irritation, later there is paralysis of the central nervous system, and the effect on the heart is much like that of digitalis. The local effects are of secondary importance.—M. C. S.

Protection of Workers in Chromium-Plating Establishments. *Forster. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 75.*

"In chromium-plating establishments, metal objects are covered with a plating of chromium by electrolysis. This new industry is developing rapidly on account of numerous economic advantages which it presents in comparison with processes used hitherto, such as nickel-plating.

"The workers employed on the electrolytic baths are exposed to chromium poisoning and lead poisoning unless adequate protective measures are adopted.

"Injury to the hands and the nasal passages may be caused when the chromium vapour which forms during electrolysis rises above the edge of the vat. It is thus necessary to dispose of the vapour by a system of ventilation.

"Lead poisoning is due to the fact that part of the apparatus and some of the fittings are of lead, which under the action of chromic acid forms lead

chromate, which has been demonstrated to be soluble up to 10 per cent. in hydrochloric acid. Lead should be replaced by aluminium in the equipment of the factories.

"The employees should also be protected by modern equipment without technical defects and by provision for cleanliness (hot water, hand brushes, soap, and towels). New regulations should also be adopted and observed by employers and personnel."

LEAD POISONING IN IRON BLAST FURNACES. *Beintker. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 73.*

"In iron foundries utilising the residues of sulphuric acid factories or zinc works, in the course of running-off, after the iron has passed, there is a flow of molten lead at a temperature of about 1,300°C. This being considerably above the boiling point, there is a profuse emanation of lead vapour, which is breathed by the workers. The vapour is not easily perceptible in the course of running-off, but causes a sweetish taste in the mouth. Several cases of lead poisoning with colic, blue line on the gums, and disturbances of the blood have been observed in blast furnaces.

"The only method of relief consists in a change of work.

"Sir Thomas Legge says that in Great Britain there have been about thirty similar cases resulting from the handling of sulphurous iron ore, and the only method of prevention consists in a regular change of work."

LEAD POISONING IN PAINTERS. *E. Brezina. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 76.*

"In the electrification of the Austrian railways numerous cases of lead poisoning were observed during the painting of the iron posts which support the wires. The first report came from the hospital at Wiedner and was made by Mr. Sternberg. Observations showed that in this work the hygienic regulations prescribed for painters by the Ministerial Order of 8 March 1923 were not completely observed, although in stationary work this industry was adequately supervised.

"This case cannot be the only instance of inadequate medical supervision of workers employed in peripatetic occupations. This kind of work should receive more attention."

HAZARDS OF SPRAY COATING PROCESSES INVESTIGATED. *H. F. Smyth. Nation's Health, May, 1927, vol. 9, pp. 24–26, 76.*

The author, in conjunction with Dr. Elizabeth Bricker of the Pennsylvania Department of Labor and Industry, was delegated to plan a combined field and laboratory study of the entire spray coating industry in Pennsylvania.

"The work began in June, 1925, and extended over a twelve months' period, including surveys in over two hundred industrial plants representing twenty-seven distinct industrial groups, physical examinations of over four hundred sprayers, and four months' intensive work on lacquer spraying in an experimental booth erected in the Mechanical Engineering Department of the University of Pennsylvania, where air velocity, time and method of

spraying and benzol content of lacquer was under control.

"Field work included 423 medical and working histories, nearly 400 chest examinations, including blood pressure readings, and almost 300 blood examinations, including red and white cell counts, hemoglobin and differential counts. One hundred and sixty-eight air velocity measurements were made with the Katathermometer, sixty-three nitration tests for benzol vapor in air, twenty-two tests for lead in air, and twenty-six Palmer counts for suspended particles. Thirty-seven paints, seventeen vitreous enamels, and forty-four urine samples were analyzed for lead."

"Summarizing the results of the survey, we find no sprayers at the time of our survey were seriously ill as the result of their work, although we did obtain histories of several cases of lead poisoning among vitreous enamel sprayers in past years, occurring in three separate plants widely scattered throughout the state, and also histories of various workers who had been made sick by lacquer spraying with poor or no exhaust ventilation.

"We found a number of lacquer sprayers showing some evidence of the effect of their work with mild symptoms indicative of benzol absorption and with blood picture more or less typical.

"More detailed discussion of the physical findings in this study and of the results of chemical air examinations and ventilation tests in plants and in laboratory tests will be found in the report of the Pennsylvania Department of Labor, and in the Report of the National Safety Council Spray Coating Survey to be published later, concerning the findings in the vitreous enameling industry."—M. G. P.

PROGRESS REPORT ON SPRAY PAINTING HAZARDS. *E. B. Bricker. Abstr. as follows from Pa. Dept. Labor, Labor and Industry, 1926, vol. 13, pp. 22–24, in Chem. Abstr., June 10, 1927, vol. 21, p. 1888.*

Air velocity in 112 cabinets ranged from 8.3 to 360 feet per minute, and in one automatic cabinet was 1,181 feet per minute. Analyses of 128 air samples for lead and for benzene, and other solvents were made, as well as 20 determinations of the number and size of suspended dust particles. Blood examinations and X-ray exposures were made.—P. D.

NOTES ON LEAD POISONING. *J. Adler-Herzmark. Abstr. as follows from Wien. klin. Wchnschr., 1927, vol. 40, p. 164, in Bull. Hyg., April, 1927, vol. 2, p. 319.*

This article consists largely of extracts taken from the annual reports of the factory inspection department of the Austrian government and particulars of lead poisoning in various trades are given. The figures given show that lead poisoning in 1925 was most numerous and severe in accumulator works and occurs chiefly in the smaller works where directions regarding dust removal are carried out with difficulty.

Some interesting isolated cases are described, among which may be mentioned the following.

A 64 year old laborer who had always previously worked on the land was employed digging sand in a garden. After nine weeks' work he had

lead colic with the line, and this was followed by complete paralysis of both hands. It was then found that in the garden there had been previously for many years a shooting butt for testing fire-arms, and that the sand was full of small pieces of lead from the bullets. The man was a drinker and of dirty habits.

Another case was that of a chauffeur with complete paralysis of both arms, lead line and severe constipation, who had been operated on for gastric ulcer a year previously. He had, ten years before, soldered lead plates for five years continuously, and it would seem that the operation in some way set free lead which had been stored in the body during ten years when he was employed on work free from lead.

LEAD STUDIES: XIV. EXPERIMENTAL STUDIES OF LEAD PALSY. *P. Reznikoff and J. C. Aub. Arch. Neurol. and Psychiat., April, 1927, vol. 17, pp. 444–465.*

The conclusions of this article are given as follows:

1. Experiments with isolated nerve-muscle preparations from frogs have shown that the onset of fatigue in muscles which have been exposed to lead is much more rapid and complete than normal.

2. The contractility of "leaded" muscles is often completely lost, and recovery from fatigue is always impaired.

3. When muscles are immersed in Ringer's solution containing lead, the acidity of the solution increases markedly.

4. A change in the permeability of the surface of muscle cell after exposure to lead is evidenced by an increased diffusion of inorganic phosphate from the muscle into the surrounding Ringer's solution.

5. As far as can be seen from the response of muscle to nerve stimulation, lead salts seem to have no deleterious action on the conductivity of the nerve of an isolated nerve-muscle preparation from a frog.

6. In one experiment, records of action currents taken from both nerve and muscle also indicate that lead acts on muscle and not on nerve.

7. Marked weakness or even palsy develops in fatigued extensor muscles of "leaded" rabbits and cats. This was manifested by great difficulty in extending the forepaw.

8. The threshold of these weak muscles to stimulation is much higher than that of unfatigued muscles or of the corresponding muscles in control animals.

9. Neither lead nor fatigue alone causes palsy, but both are necessary to establish the condition. This is indicated by experiments in vitro with isolated nerve-muscle preparations and by the similarity between the threshold values of unfatigued muscles of "leaded" animals and the muscles of the controls.

10. Such experiments indicate that the physiologic lesion of lead palsy is in the muscle itself and that the muscles which are fatigued are most susceptible to lead paralysis.

11. An attempt has been made to explain susceptibility to lead palsy on the basis of the chemical and physiologic reactions between the metabolic products formed during muscular activity and lead as it occurs in the human organism.

SULPHUR MONOCHLORIDE POISONING. *Adler-Herzmark. Reprinted from Internat. Labour Office, Studies and Rep., Series F (Indust. Hyg.) No. 10, 1926, p. 76.*

"In a department of an india-rubber works where sulphur monochloride (not carbon disulphide) is used in manufacture, a worker who had been employed on a rubber rolling and pressing machine for many years fell ill. His symptoms included jaundice and great loss of weight. After fourteen days' treatment in hospital no signs of neoplasma appeared, but fourteen

days later he was suffering from paralysis of both legs and of the bladder and rectal aperture, in other words *symptoms resembling those of myelitis.* There was also slight paresis of the forearms. The Wassermann and Goldsol tests were negative and the state of the blood was normal. No signs of syringomyelis [sic]; symptoms of jaundice less acute. Some days later the only symptoms were paresis of the extensory muscles of the leg. Arms normal. Rectal functions normal. Atrophy of the leg muscles. No other signs of nerve affection. Some weight regained. Analogous symptoms might have been caused by influenza. Case uncertain.

"A second worker employed on similar work, who showed no other symptoms of illness, suffered from yellow discoloration of the skin of the face and of the whites of the eyes."

TOXIC-EPIDEMIC INDUSTRIAL ILLNESS FROM WORK WITH TAR (GOUDRON). *G. Rostowzew. Gigiena Truda, 1926, no. 2, pp. 64–66.*

The author cites an instance in which six persons who were employed in loading and transporting tar (*goudron*) were poisoned. The symptoms were: inflammation of the exposed parts of the body (face and hands), irritation of the mucous membrane of the eyes, symptoms of general poisoning of the organism (vertigo, severe headaches, nausea, and vomiting). In the course of ten days, all those poisoned recovered.—A. W. N.

DUST HAZARDS AND THEIR EFFECTS

CONTRIBUTIONS TO THE STUDY OF MINERS' PHTHISIS. *A. Mavrogordato. So. African Inst. Med. Res., Pub. No. 19, pp. 84. Johannesburg, Dec., 1926.*

An effort is made by the author to portray his conclusions based on a four years' study. The position is, however, only brought up to January, 1925; thus, as is only too customary with South African publications on medical research, this important paper is already more than two years old before it reaches this country.

Miners' phthisis results from two factors acting together, namely, a phthisis producing dust, and the tubercle bacillus. Both these factors are dealt with in the cell system of the body by the macrophage cell. This cell is held to be capable of conversion into a white fiber. Such a white fiber is an end element and irreversible. The presence of particulate matter, whether tubercle bacilli or silica particles, stimulates the production of macrophages, and may send the cell system "fiber-ways." The lungs exert a specific filtering action on macrophage cells. These cells tend, under the influence of particulate matter, to aggregate into pseudotubercles and become arrested in the lymph passages.

The term "silicosis" is applied to that condition of the lungs (a form of pneumonokoniosis) which results from the inhalation of minute particles of silica; it is the scientific designation of miners' phthisis. No other dust is known to act in the same way. The dangerous dust particles are about the size of common micro-organisms. Silica dust is less readily eliminated from the lungs than is other dust, and therefore

the inhalation of comparatively small quantities tends to its accumulation in the lungs. Hardness and sharpness have little significance in regard to these particles; indeed, the sharpness of a particle 1 micron in size is rather a subtle consideration. The peculiar influence of silica dust is related to its slow solubility in the tissues followed by a chemical reaction. The solubility is slow, or local necrosis would promptly follow. Silica dust in the lungs influences the resistance to tuberculous infection, even before it produces fibrotic changes. Unless dust possesses the property of provoking tubercle formation and thus securing arrest of macrophage cells, it probably exerts no influence on pulmonary tuberculosis. The presence of silicotic fibrosis can be detected by the naked eye by the appearance of pigmentation, due to carbon which has been deposited on the silica. But no evidence has been secured that the presence of coal dust, at least in the lungs of guinea-pigs, protects against pulmonary tuberculosis.

Various experiments are described in which animals were tested, either by being kept under working conditions in the gold mines, or by being exposed in the laboratory to an atmosphere containing dust and subsequently being given doses of tubercle bacilli. Both with guinea-pigs and with rats, evidence showed that dust definitely lowered the resistance of the animals to infection. The presence in the lungs of dust of silica was found definitely to lower natural immunity to tuberculosis, even without first causing gross damage to the lungs. A close relation was found between a pathologic condition resulting from the presence of the dust and the presence of an infection; the infection expediting the action of the dust, just as the dust, on its part, aided the infection to get a footing. Thus, an experimental unresolving pneumonia can be produced after exposure to phthisis producing dust by intratracheal inoculation of pathogenic organisms; this condition can be brought about apart from a tuberculous infection. Infection may be superimposed on a silicotic nodule and then surrounded by granulation tissue, which subsequently becomes fibrotic and closes in the infective process; such closed silicosis presents no evidence of early infection. On the other hand, the inhalation of a phthisis producing dust into an already infected lung is particularly harmful. Without doubt clinical silicosis on the Witwatersrand is very often infective silicosis.

Every miner when out of health, even though exhibiting no evidence of silicosis or tuberculosis, should be put off work in order to enable him to recover his resisting power. With the development of tuberculosis, the stigmas of silicosis become manifest, almost abruptly, all over the lung; indeed there exists an almost constant association between silicosis and tuberculosis on the Rand, even though the initial infective factor is not always tuberculous. All fatal cases of miners' phthisis present unmistakable tuberculosis. While there may be no agreement as to the most common channel of entry of the tubercle bacillus into the body in the case of miners' phthisis, it seems probable that it enters by the same route as the dust. If infection by inhaling droplets be conceded, the ideal conditions for its

occurrence are realized underground in the gold mines, where the humidity and temperature are both high; water which is used to hinder the dust factor may facilitate the tuberculous factor. Exclusion of cases of tuberculosis from the mines is of first importance; particularly should this precaution be followed up for native labor. The first improvement worth having with regard to reduction in silicosis occurred when the dust concentration was reduced to 20 mg. per cubic meter. But a heavy incidence of the disease still continued. The next great improvement occurred when the dust was reduced to 5 mg. per cubic meter. At this level a less grave form of the disease is produced. But the incidence is still formidable. The level of safety has not yet been determined.

The dust present in the air is derived from two sources: (*a*) that made from day to day during mine work, and (*b*) the body of dust which is always circulating around the mines. Reduction of the dust made from day to day cannot be fully effective unless that in the air is carried away and not left to circulate through the workings. Much has been done by the Regulation which insures that blasting shall take place at the end of the shift and only once in twenty-four hours, and by endeavoring to control the dust generated by pneumatic drills. Three factors are suggested as influencing the incidence of miners' phthisis: (*a*) tubercle bacilli, (*b*) silica dust, and (*c*) water droplets, which may be the means of transport of the tubercle bacilli. The way of salvation lies in working in big currents of clean air, with an efficient means of catching the dust at the source of production.

Finally the author discusses the possibility of raising resistance to tuberculosis among the miners by a suitable vaccine; such a proposal, however, remains still outside the realm of practical procedure.

This monograph contains a number of excellent illustrations, as well as a series of graphs. It must be looked upon as one of the most important contributions to our knowledge on the subject of silicosis that has yet appeared.—E. L. C.

THE EFFECTS OF SILICA DUST UPON THE LUNGS. *R. R. Sayers. Am. Jour. Pub. Health, March, 1927, vol. 17, pp. 208–214; April, 1927, pp. 348–351.*

The first part of the paper contains a discussion of the physiologic action of silica dust on the lungs; a review of laboratory studies by Gardner, Mavrogordato, Carleton, and others on the effects of inhaling granite, marble, carborundum, feldspar, china clay, limestone, shale, quartz, coal dusts, and the like; and sections on the three stages of silicosis and their determination by X-ray.

The second part describes the instruments now available for making dust determinations and concludes with recommendations for the prevention of silicosis, briefly as follows: Wet drilling alone is not a guarantee of safety; dust collectors for trapping dust at the source have yet to prove their application in the field; ventilation is the most important single preventive measure for reducing dustiness; initial and periodic examinations of persons employed in industries where dusts, and especially silica dust, are present in the air are important, in order that silicosis may be detected

in its earliest stage and that those predisposed to respiratory disease may be advised to seek other employment. —M. G. P.

SOURCES OF DUST IN COAL MINES. *J. J. Forbes and A. H. Emery. U. S. Bur. Mines, Rep. Investigations, Serial No. 2793, Feb., 1927, pp. 17.*

"All dust samples were collected to be as nearly representative as possible of the dust-producing operations, such as undercutting across a 10, 20, 30, or 40 foot face, completely loading cars by one or two workers, and transporting coal in rapid or slow-moving trips. For undercutting, the collection was commenced before sumping operations, and was continued until the entire face was undercut. Samples were taken in development entries and along main haulage-ways, where mules, motors, or ropes were used. None were taken in pillar workings. In order to get the average dustiness throughout the day, dust sampling was done before men started to work, and throughout the working shift at intervals of one-half to one hour. These were supplemented by atmospheric dusts taken at representative places throughout the mine."

"The composition of the dust, as determined by petrographic examination, varied with the material handled. Mechanical drilling was done in sandstone, shale, and slate roof. Dust samples collected during these operations showed little or no coal. Auger drilling by hand was performed in both roof and coal, and the composition of the dust raised consequently corresponded to the material drilled. Mining machines occasionally dug into the floor, but more than 99 per cent of the dust raised during undercutting was coal. Bony partings shot down with the coal occasionally contaminated the dust produced during loading, but 99 per cent of this material was coal dust. Along the haulageways the composition of the dust varied. In non-rock-dusted entries, the suspended particles were almost entirely coal but in rock-dusted places some of the atmospheric dust was of the same material as that used for rock-dusting."

The following conclusions are arrived at from this investigation:

1. Jackhammer drilling produced the greatest concentrations of dust of any of the mine operations, 10 times as much as any of the others, and the other dust-producing operations arranged in decreasing order of concentration were electric drilling, undercutting coal by dry methods, auger drilling by hand, loading coal, undercutting coal with the application of water on cutter-bar of mining machines, simultaneous pick mining and loading coal, loading rock, haulage, and finally, pick mining.

2. The largest total amount of dust was raised by dry undercutting.

3. Undercutting coal without the use of water on the cutter-bar raised the greatest concentration of dust of any of the common mine operations; loading coal ranked next and haulage last.

4. The chief method for the prevention of dust is the liberal use of water at the face of workings to prevent the dust at its source. It was found that after water had been applied to cutter-bars the amount of dust was reduced to one-seventh of that raised by dry cutting. Moreover, samples taken out by the face of workings where water was used plentifully at the face show a decided decrease in the amount of dust over mines exclusively using dry methods.

5. In almost every instance where sampling was done at the face there was no air movement and the dust was removed almost entirely by free settlement. The best method for removing suspended dust is to provide sufficient circulating air to the face of workings.

6. The ideal combination for explosion prevention is the widespread use of rock dust supplemented with liberal use of water at the face. This elimination of the coal dust at its source lengthens the life of the rock-dust application and necessarily reduces the rock-dust renewals.

The actual dust concentrations found varied from 1,045 mg. per cubic meter of air with jackhammer drilling to 5.7 mg. per cubic meter with pick mining.—P. D.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

ANTHRAX IN THE LAST TWENTY-FIVE YEARS. *P. Graf. Abstr. as follows from München. med. Wchnschr., Nov. 5, 1926, vol. 73, pp. 1888–1889, in Bull. Hyg., May, 1927, vol. 2, p. 376.*

Complete statistics of human anthrax have not been available in Germany since 1914, but Dr. Graf has examined the incidence of the disease in tanneries since 1901 until 1925; and he considers that the considerable fall of "tannery" anthrax in the last ten years is due to different methods of preparing skins. Anthrax also tends to disappear under the influence of light and air, in filter beds or in fields irrigated with sewage, and this tends to purify the water from the tanneries. The incidence of the disease varies in different parts of the country and he considers that steps should be taken to prevent entirely the use of skins from sick animals, rather than to adopt uncertain and expensive methods of examination or treatment.

SOME FACTORS AFFECTING THE PROPAGATION OF HOOKWORM INFECTIONS IN THE ASANSOL MINING SETTLEMENT, WITH SPECIAL REFERENCE TO THE PART PLAYED BY COCKROACHES IN MINES. *A. C. Chandler. Abstr. as follows from Indian Med. Gaz., 1926, vol. 61, pp. 209–212, in Bull. Hyg., Jan., 1927, vol. 2, p. 63.*

The author investigated conditions in the Asansol mines and was struck by the fact that infection by hookworm was much less general and severe than would be expected, temperature, humidity, and sanitary arrangements being favorable to infestation.

He found that cockroaches (*Periplaneta americana*) were plentiful and that the feces formed their only food supply. Experiments indicated that any eggs which pass out in the roaches' excreta are fertile, but that only few do pass out, the majority being destroyed by the chitinous grinding organs in the proventriculus of the roach. It is suggested that rats and mice which prey on roaches in mines should be trapped.

It was found that where large quantities of feces were frequently deposited in one place, the roaches could not keep pace with the supply and infective larvae were present in the soil, but that where the deposit of excreta was less concentrated much less soil contamination resulted.

TUBERCULOSIS IN CIGAR WORKERS. *Grünbaum. Med. Klin., Nov. 19, 1926, vol. 22, p. 1792; abstr. in München. med. Wchnschr., Dec. 10, 1926, vol. 73, p. 2141.*

J. I. H.
Oct., 1927

TUBERCULOSIS IN TOBACCO HANDLERS. *Berlin Letter, Jour. Am. Med. Assn., Jan. 29, 1927, vol. 88, p. 338.*

Dr. Grünbaum, director of the Versorgungs-Kuranstalt in Nauheim, has made a statistical study of health conditions among tobacco workers of Baden and the southern part of the Palatinate. In these regions tuberculosis mortality and infant mortality are high; but infant mortality may be high in regions in which the incidence of tuberculosis is low. In other places, the tuberculosis mortality and the infant mortality are below the average, but every place in the regions investigated that had a high incidence of tuberculosis had also a high infant mortality. His researches have led him to the conclusion that "tobaccosis" does not exist; that is, a direct connection between tobacco dust or nicotine injuries, on the one hand, and tuberculosis morbidity and tuberculosis mortality, on the other hand, cannot be established. Employment in a hygienic tobacco factory does not endanger health. On the contrary, it must be assumed that the tobacco industry seeks out regions in which economic conditions are particularly bad, for the reason that cheap labor can be readily procured. It would seem therefore that the problem is more properly a subject for investigation by political economists or social hygienists than by medical specialists.

DILATATION OF THE LUNGS AND OCCUPATION. *Von Schnizer. Med. Klin., Nov. 5, 1926, vol. 22, p. 1730.*

MILIARY TUBERCULOSIS AND OCCUPATIONAL INJURY. *Von Schnizer. Med. Klin., Nov. 19, 1926, vol. 22, p. 1807.*

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

OCCUPATIONAL DERMATITIS. *W. J. O'Donovan. Abstr. as follows from Jour. State Med., Jan., 1927, vol. 35, p. 42, in Jour. Am. Med. Assn., March 19, 1927, vol. 88, p. 962.*

O'Donovan suggests that the question of invalidity due to occupational diseases of the skin is so great and so important that it deserves the investigation of nothing less than a special commission.—K. R. D.

FOLLICULAR KERATOSIS AND MELANOSIS IN ONE CASE; OIL ACNE AND KERATOSIS IN ANOTHER. *Ravaut and Vibert. Bull. de la Soc. franç. de dermat. et syph., April, 1927, pp. 214–216.*

The interest of this paper lies in the fact that one of the patients developed the "melanosis of Riehl" or what the French call *poikilodermia reticulée pigmentaire.* A succession of cases have now been reported. The persons affected have invariably been associated with some form of mineral oil. So many handle this material, and so few suffer from this peculiar type of pigmentation, that its presence strongly suggests an individual predisposition.

The case in point was an unmarried woman, aged 52, employed in a piano factory. She was engaged in polishing copper screws, in machine oil. After a month of this work, small dark

spots appeared, which gradually formed into sheets. These spread over most of the uncovered parts of the face, neck, upper parts of the chest and back, and the forearms. With rest and absence from work, the pigmentation lessened rapidly.—R. P. W.

A Distinctive and Severe Form of Erysipeloid among Fish Handlers. Report of Clinical and Laboratory Studies; Demonstration of the Bacillus of Swine Erysipelas. *J. V. Klauder, L. L. Righter, and M. J. Harkins. Abstr. from Arch. Dermat. and Syph., Dec., 1926, vol. 14, pp. 662–678, in Bull. Hyg., April, 1927, vol. 2, p. 309.*

This paper reviews about 1,000 cases of erysipeloid occurring among commercial fishermen who are engaged in working in fish pounds along the northern New Jersey sea coast. A bite from the mouth, or prick from a scale, spine, or tail of a fish inflicts a slight trauma. In about twenty-four hours the characteristic swelling appears and rapidly spreads to the adjoining fingers. Pain is early and conspicuous. The lymph glands enlarge and become tender, but never suppurate. Fever and headache are usual during the first twenty-four hours. The typical purplish-blue redness may extend over any part of the hand, or even over the wrist. The length of the attack varies from two to six weeks. It apparently depends upon the virulence of the strain of the organism of "swine erysipelas."

The disease is restricted to the months of May to September. It follows injuries inflicted by certain prickly and slimy fish described by these authors. The fisherman's clothing may convey the infection. The virus is resistant to drying, light, and lengthy exposure to the air. It seems to be extraordinarily widely spread and its effects are well known by fishermen in different parts of the world.

A Case for Diagnosis. *Arch. Dermat. and Syph., May, 1927, vol. 15, Soc. Tr., p. 608.*

"L. H., a man, aged 30, had first noticed an eruption on the flexure of the forearm nineteen days before presentation. It gradually became generalized, the elementary lesion being a small erythematous papule. The fauces were erythematous, and there was a grayish membrane on the gums which could be detached without bleeding. The axillary lymph nodes were palpable. There was some malaise, but a normal temperature. Gradually the eruption became macular and exfoliative, resembling seborrheic dermatitis, and this was the appearance at the time of presentation. The patient had been delivering fuel oil for two months prior to the onset of the eruption. He had used ethyl gas in the motor of his truck, and had constantly inhaled the fumes from a leaking exhaust pipe. It was thought that either the oil or the exhaust gas might have been the etiologic factor."

Discussion of this case brought out the fact that three oil station employees with a similar dermatitis had been seen within the month.

Bakers' Itch. *Brit. Med. Jour., May 7, 1927, vol. 1, pp. 849–850.*

A Welfare Order has been issued by the Home Office which applies to bakehouses. It calls for washing and cloak room accommodation, a first

aid box, drinking water, and the posting up of a "Cautionary Notice as to the prevention and cure of dermatitis among workers handling flour and sugar." The evidence upon which the need for this Welfare Order is based was contained in a report made by Dr. A. C. Parsons, which appeared in THIS JOURNAL (1923–1924, vol. 5, p. 411). The conclusion was then arrived at that at least the great majority of cases of dermatitis among bakers originated from lack of cleanliness, which was accentuated by dough sticking to the skin. The washing accommodation to be provided must permit the baker to cleanse the forearms, including the elbows, as well as the hands; for this reason the lavatory basin or trough must be not less than 20 inches long and 7 inches deep. Reference to Dr. Parsons' original article will indicate how great was the need for this Welfare Order.—E. L. C.

EXOGENIC DERMATITIS. *W. J. O'Donovan. Lancet, May 28, 1927, vol. 1, pp. 1128–1129.*

The term "exogenic dermatitis" is introduced rather unnecessarily by the author to denote dermatitis due to external irritants, including most forms of occupational dermatitis. The existence of two types of abnormal skins is noted, one unusually dry, and the other abnormally moist. Either is liable to develop dermatitis on slight provocation. A skin disposed to such a condition as cheiropompholyx may exhibit this affection owing to an external influence, such as sunlight, soap, water, formalin, or acids. Generally the reaction to external influences depends largely on the skin rather than on the influence; hence the origin of certain cases of dermatitis may escape recognition when the influence is some domestic appliance, such as paint cleansers, disinfectants, or insecticides. The author even claims that such specific ulcers as chrome holes and cement burns are specific to the patient rather than to the irritant; here he seems to be carried away by his theme rather than by facts. Dermatitis of external origin tends to become chronic, if the patient possesses any hereditary tendency to skin trouble; but in addition, compensation payments may lead to the continuance of the condition by the patient's irritating the skin, or allowing scratching to become an ingrained mental habit. In these cases satisfactory financial settlement often produces immediate and gratifying cure.—E. L. C.

INTRAOCULAR FOREIGN BODY PROBLEMS. *P. S. Mertins. Am. Jour. Ophth., June, 1927, vol. 10, pp. 414–416.*

"Details of actual cases teach the management of ocular injuries. Four cases are here reported. In one, lack of accurate x-ray examination led to inefficient treatment. A good radiogram made possible extraction of copper, lying on the retina. In case 2, unsuccessful magnet extraction was followed by success, when a cataract knife was used as a magnet extension. In case 3 the patient failed to come for magnet extraction, and later had the eye enucleated. Case 4, multiple shot wounds in both eyes caused loss of vision in one; but allowed useful vision in the other for at least ten years."

In Cases 2 and 3, the accident occurred while the men were hammering a steel bolt and a nail, respectively.

A spicule of steel 1 by 2 mm. was extracted in Case 2; in Case 3, on section a spicule of steel 2 by 3 mm. was found embedded in the lower anterior section of the retina.

MINERS' NYSTAGMUS. *F. Fergus. Brit. Med. Jour., June 18, 1927, vol. 1, pp. 1092–1094.*

Reasons are given for attacking the findings of the Miners' Nystagmus Committee and for rejecting defective light as the causative influence of miners' nystagmus. The introduction of electric lights underground has been known to aggravate the disease which is more frequent at certain periods of the year. A recovered miner may relapse without return to work. Defective illumination does not explain why the eye movements are rotational or why cases occur in epidemics. Cardiac instability is stated to be more frequently present than oscillation of the eyeballs. Reinvestigation is held to be needed; and the possibility is suggested of the disease being due to a toxin or a micro-organism. Details are quoted of eight interesting cases to indicate that electric light is by no means a preventive to miners' nystagmus. The author bases his attack on the assumption that electric lamps in mines give more light than oil lamps; in fact they by no means always do so.—E. L. C.

MINERS' NYSTAGMUS. NOTES FROM THE SOUTH WALES COAL-FIELD. *F. Robson. Brit. Med. Jour., June 18, 1927, vol. 1, pp. 1094–1095.*

The author again points to the relation existing between the incidence of nystagmus and the kind of coal worked; it is more frequent where more gas is given off by the coal, and where, in consequence, safety lamps giving less light than naked candles have to be used. Electric lamps have actually been known to precipitate quiescent cases and aggravate others. The collier working at the coal face suffers most, but other workmen underground may also be affected. Subjective symptoms may occur without any objective oscillations of the eyes. Other pathologic conditions, *e.g.*, high blood pressure, nephritis, tachycardia, and headache, are common among nystagmic miners.—E. L. C.

MINERS' NYSTAGMUS. *H. G. Allen. Abstr. as follows from Med. Jour. Australia, June 5, 1926, vol. 1, pp. 654–657, in Bull. Hyg., April, 1927, vol. 2, p. 322.*

A record is given of evidence on the occurrence of miners' nystagmus in Australia placed before a Royal Commission on the Coal Mining Industry. The author had seen 100 or 200 cases in five years and his experience coincides with that of the British Committee. The disease is a specific occupational trouble quite unlike nystagmus of nervous origin, characterized by involuntary rotatory oscillation of both eyeballs, associated with head tremor and lid spasm; subjectively headache, giddiness, photophobia, failure of dark adaptation, and a train of neurasthenic symptoms develop. The sole cause is attributed to defective illumination; the more it is defective the more are the cases noted. Safety lamps whether oil or electric give far less light than naked flames. The cap lamp is the most serviceable substitute; it may even be worn on the chest. Surface work is invaluable

treatment; lack of occupation accentuates the neurasthenia while compensation, although socially just, is bad treatment. Failure to be able to resume coal mining should only result in a small minority of cases. Australian climate and open air life favor recovery.

MINERS' NYSTAGMUS. ADDRESS BY DRS. J. S. HALDANE AND T. L. LLEWELLYN. *Brit. Med. Jour., April 30, 1927, vol. 1, pp. 809–810.*

The prevention of miners' nystagmus belongs to mining engineers by the removal of its cause—defective illumination. The evidence that the disease is due to lack of light cannot be controverted. The condition is occupational and is restricted to coal miners working with hand safety lamps which give only one-fifth the light of a naked candle. Such light rays, reflected from black coal, afford an illumination below the limit of the power of the eyes for adaptation. In America where electric lamps, worn in the cap and giving good light, are used, the disease is unknown. It results from eyestrain, caused by the effort to see, or even by an inherited deficiency in light sense, which affects individuals differently and may be increased by influences lowering the general health, or by awkward postures while undercutting coal. The economic factor of compensation has added to the manifestation of many cases when wages are low or work is slack which might otherwise have remained latent. Idleness represents bad treatment, which, however, becomes difficult when neurasthenic symptoms have developed. The solution of the problem lies in improving lighting underground.—E. L. C.

THE IMPROVEMENT OF MINERS' ELECTRIC LAMPS. PART I. THE SELECTION OF BULBS. *H. M. Vernon. Colliery Guardian, March 18, 1927.*

PART II. THE IMPROVEMENT OF THE ALL-ROUND LUMINOUS INTENSITY BY MEANS OF REFLECTORS. *H. M. Vernon and J. J. Manley. Ibid., March 25, 1927.*

PART III. GLARE AND ITS REDUCTION. *H. M. Vernon and S. Adams. Ibid., April 1, 1927.*

The occurrence of the occupational disease, miners' nystagmus, among coal miners of Great Britain and on the continent of Europe, which is accepted to be due to the dim illumination in which the men work, lends interest to anything connected with illumination underground in coal mines.

The authors show that the illumination of electric lamps varies with the position of the filament, greatest luminous intensity being given by the filament when in the broadside on position; this intensity may be twice that given in the end on position. Observations are reported in detail of the relationship between the form of filament and the distribution of light. The suggestion is made that improved illumination can be obtained by paying attention to the form of the filament. Another way in which illumination can be improved is by the use of reflectors. On an average the luminous filament throws more light in a vertical than in an horizontal position. Yet the effective rays from miners' lamps are the horizontal rays. Metal reflectors with a contour resembling a parabolic arc were designed,

which increased the mean horizontal luminous intensity of lamps 44 per cent. A well glass was also designed which, in conjunction with a metal collar, increased the illumination 45 to 64 per cent.

A matter of some importance in the dimness of coal mines is the glare caused by the bright filaments of electric lamps. Laboratory investigation revealed that such glare causes visual afterimages, which may impair accuracy when working with a pick at the coal face. In one instance, the average error made was increased by glare 33 per cent. Glare causes much discomfort in the dark-adapted eye, the discomfort increasing with the first two or three hours of dark adaptation. Frosted glass removes such discomfort.

These studies are an interesting contribution to the whole question of underground illumination.—E. L. C.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

PSYCHOLOGIC CONTRIBUTION TO THE STUDY OF FATIGUE DURING MAXIMUM BODILY EXERTION. II. THE PSYCHOMOTOR ACTION. III. MENTAL EFFICIENCY. *W. Ewig and T. Wohlfeil. Arch. f. Hyg., 1926, vol. 97, pp. 251–260; 261–271.*

These are the second and third installments of a study on the fatigue of men while rowing. They contain observations made (1) before the subjects began to row, (2) during rowing, until the point of "second wind" (*toten Punkt*), and (3) after the second wind. The first part was abstracted in THIS JOURNAL, 1927, vol. 9, p. 157.

In the second part, the authors conclude that bodily strain from continuous work leads to a disturbance of the psychomotor action as soon as signs of fatigue appear. This is shown by the time it took the subjects to react to the tests. The reaction time was at a minimum before the subjects began to row, at a maximum during rowing, near the point of second wind, and somewhere between the two after the second wind. The number of false reactions, or errors, followed the same order.

The well-known depression in mental efficiency resulting from fatigue is shown in the third part of the study. Fatigue was found to affect both the quality and the quantity of mental work.—C. P. Y.

VITAL CAPACITY AND PHYSICAL STANDARDS OF STUDENTS OF THE UNIVERSITY OF THE PHILIPPINES. *J. C. Nañagas and L. C. Santiago. Philippine Jour. Science, March, 1927, vol. 32, pp. 325–359.*

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

SANITARY CHARACTERISTICS OF INDIVIDUAL BRANCHES OF EMPLOYMENT. *S. Kaplun. Zentralbl. f. Gewerbehyg., Nov., 1926, N.S. vol. 3, pp. 309–312.*

The author emphasizes the fact that from the hygienic standpoint every industry is far from being uniform and that this should be taken into consideration in compiling statistics.

Under the soviet régime, the newly instituted authority, the People's Labor Commission, began to foster legislation for industrial hygiene. The employer is required to provide the employee, free of charge, with special working clothes that will protect him from certain injurious effects of his occupation; working hours are shortened in dangerous occupations; milk and fats are supplied in many hazardous occupations; vacation periods are specified; and various forms of em-

ployment are closed to women and children.

It became necessary to apply these regulations to the separate branches of an industry, rather than to the entire industry; therefore the Commission caused an investigation to be made into all important branches of industry and transportation systems. For the purpose of unifying this entire undertaking a special chart of sanitary characteristics was prepared in 1920. A number of the questions contained therein are given in detail, together with comments regarding defects and possibilities. Different questionnaires were used in various occupations.

The writer gives a list of the branches of employment already investigated in this manner, and points out that this is but the first phase of the problem. Further classification and grouping of the separate injuries must be made, and upon this basis the questions of industrial pathology and occupational selection must be investigated.—A. W. N.

Accident Prevention in Russia. *Pöpelt. Zentralbl. f. Gewerbehyg., Oct., 1926, N.S. vol. 3, pp. 273–275.*

In prerevolutionary Russia no attention whatever was given to the question of protection for the laborer, and only isolated, socially minded physicians concerned themselves with individual cases in this field. Labor protection was first made a fundamental problem of state politics and legislation by the October revolution of 1917.

In czarist Russia there were in all only slightly over 200 factory inspectors, all of whom were engineers. They were so overburdened with numerous official duties that they could give very little time and attention to the business of their special field. At the present time there are in the entire country more than 1,500 industrial inspectors. They are chosen from among the workmen by the corporations and watch over the legal side of the workmen's protection. Whatever concerns the special inspection of the work is attended to by qualified specialists. There are 232 physicians who act as health inspectors and 313 engineers who act as technical inspectors. They are required not only to inspect and to revise the work and the management, but also to conduct scientific research in the field of that branch of industry in which they are active.

The largest institution for scientific research in the field of industrial health protection is the State Institute for Workmen's Health. The writer details the activities and the aims of this Institute. Other institutions are also described: the Ukrainian Institute established in 1924 at Kharkov, which specializes in industrial diseases; the Obuch Institute for the Study of Occupational Diseases, founded in 1923 at Moscow; the Clinic for Social and Occupational Diseases at Moscow; and the Institute for Occupational Diseases, operating since 1925 at Leningrad.— A. W. N.

Health Conditions in the Manufacture of Artificial Silk. *B. Berlin. Gigiena Truda, 1926, no. 9, pp. 27–32.*

Investigation of the manufacture of artificial silk in the "Viscosa" factory gave the following results:

1. The most important factor in-

jurious to health in the manufacture of artificial silk is carbon disulphide present in considerable quantity in the air of the chief departments of the factory.

2. Material collected in the course of one and a half years is not sufficient to show a definitely established relation between individual diseases and processes of occupation. Conjunctivitis of the spinner is, however, without doubt to be considered an occupational disease.

3. The fact that during the investigation no sharply pronounced nervous diseases were observed, such as were substantiated before the revolution, is due to the better ventilation and the introduction of the six-hour day in the xanthic acid department and in the spinning room.—B. A.

Occupational Risks in Textile Industry and their Prevention. *W. Loch. Abstr. from Zentralbl. f. Gewerbehyg., Jan., 1927, N.S. vol. 4, pp. 15–22; Feb., 1927, pp. 36–45; in Bull. Hyg., Aug., 1927, vol. 2, pp. 615.*

In this and the previous number an attempt is made to describe all the various processes in the woolen, cotton, and linen industries, with special reference to the dangers attending each one, as they come before a factory inspector [and should come before the employer] with a view to prevention. The address formed part of a course of instruction on factory hygiene organized by the German Association for Factory Hygiene which is financed by industrialists. The article is mostly concerned with prevention (1) of injury to health from dust, by locally applied ventilation; (2) of moisture and high temperatures, by general mechanical ventilation; and (3) of accidents (flying shuttles, etc.), by suitable guards.

SYSTEMIC OCCUPATIONAL DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

Spinners' Scrotal Cancer. *J. Robertson. Ann. Rep. Med. Officer of Health for Darwen for 1926. News Office, 1927.*

This note is a supplement to the author's article published in This Journal (1927, vol. 9, p. 217). Dr. Robertson holds that no adequate reply has been made to his criticism of the accepted causation of mule spinners' cancer; he maintains that no oil can reach the spinner from the bolster or any part of the spinning mule; and definitely ascribes spinners' scrotal cancer to friction of the fork of hard blue or white overalls acting upon the scrotum each time the spinner leans over the faller shaft to piece. The fork is pulled up by the stretching movement of the body entailed in the piecing operation acting through an inelastic shoulder brace. Prevention should lie in discarding braces for waist belts and in washing of thighs and scrotum daily. Some additional facts are given in tabular form.—E. L. C.

Heart Disease and Occupation. *Von Schnizer. Med. Klin., Oct. 8, 1926, vol. 22, p. 1575.*

Occupational Injury and Pernicious Anemia. *V. Schnizer. Med. Klin., Sept. 10, 1926, vol. 22, p. 1422.*

Epilepsy and Occupational Injury. *E. Rubensohn. Med. Klin., Sept. 24, 1926, vol. 22, p. 1498.*

A Case of Dupuytren's Contraction Resulting from Occupation. *O. Muchatschowa and B. Bychowsky. Gigiena Truda, 1926, no. 9, pp. 60–61.*

In workman R., aged 63 years, examined for the purpose of determining the degree of loss of working capacity, a typical Dupuytren's contraction of both hands was discovered, and resulting chronic trauma of many years' duration. For the last sixteen years, R. had tested the products of manufacture. Among other things he had to inspect the length and the thread of the screw part of the product; this has to be done in the following manner: the worker places the pattern on the end of the piece of work, screws it fast with quick motions, and then unscrews it in such a way that he strikes the pattern with the medial edge of his left hand; the piece of work then is held firmly between the palmar surface and the fingers of the right hand. In the course of a workday R. tested in this way 500 to 700 pieces; during the war as many as 1,500.—B. A.

Condition of the Upper Air Passages in Millers. *W. Kulikow. Gigiena Truda, 1926, no. 9, pp. 55–60.*

One hundred and twenty-seven workers in a rolling mill in Leningrad presented themselves for examination. With the exception of one person, all those examined had worked in the mill for a long time, and in different places; 52.7 per cent. had worked five years or more.

Twenty-three persons (18 per cent.) possessed healthy air passages; 68.5 per cent. suffered from rhinitis. In the throat and nasopharynx the following conditions were observed: hypertrophy of the mucous membrane of the back pharyngeal wall in thirty-one cases, atrophy in thirty-three, enlargement of pharyngeal tonsils in fifty-five; 42.5 per cent. suffered from pharyngitis, 38.5 per cent. from laryngitis (13.3 per cent. acute and 25.2 per cent. chronic). The ears were examined only by otoscope and questioning the workers; diseases of the ear (catarrhal otitis, embolus, chronic suppurative otitis, etc.) could be established altogether in 56.35 per cent.—B. A.

POISONOUS HAZARDS AND THEIR EFFECTS: GASES, CHEMICALS, ETC.

Poisoning with Arsine. *R. Labes. Abstr. as follows from Deutsch. med. Wchnschr., Dec. 24, 1926, vol. 52, p. 2192 (conclusion), in Jour. Am. Med. Assn., March 26, 1927, vol. 88, p. 1043.*

Labes found that arsine (AsH_3) is oxidized by the oxyhemoglobin of the erythrocytes to a colloidal form of arsenic, which destroys the structure of the erythrocytes.—K. R. D.

Concerning Dust Containing Sulphuric Acid. *L. Schwarz and W.*

Deckert. Zentralbl. f. Gewerbehyg., Nov., 1926, N.S. vol. 3, pp. 314–315.

As a result of cleaning the boilers of a steamer, irritation of the deeper air passages and erosions of the skin made their appearance. It developed that the boilers had been fired with "Masut," a petroleum by-product, the sulphur content of which becomes oxidized into sulphuric acid during the firing and settles in the flues. The cleaning of the flues occasions much dust which, inhaled into the air passages or settling on the perspiring skin, gives up its sulphuric acid and exercises a corrosive action.

As protective measures greasing the hands and forearms with a suitable salve (perhaps containing wax) and the use of accurately fitting respirators and goggles are suggested.

A second investigation of material containing sulphuric acid was suggested by the illness of a lighterman who unloaded a copper containing ore. The ore was stored tightly in the hold and had to be loosened by picks. More or less dust was developed, varying with the moisture, temperature, and circulation of air. The ore was subjected to a mechanical examination, during which the inspectors experienced from the dust an irritation of the conjunctiva, considerable secretion of the mucous membrane of the nose, with repeated, violent sneezing and occasional coughing, and an acid taste in the throat.

For the protection of the workmen it is recommended that the development of dust be prevented as far as possible and that the workmen be relieved every half hour so that they can refresh themselves in the open air. The wearing of goggles and of properly constructed respirators would be very useful. The German regulations, however, require the employer to furnish the necessary protective appliances and the frequent change of workers renders it difficult to deliver these articles in a sanitary condition and of a suitable form.—A. W. N.

SEVERE EROSION FROM 25 PER CENT. SILVER NITRATE SOLUTION. *O. Thies. Zentralbl. f. Gewerbehyg., Nov., 1926, N. S. vol. 3, pp. 315–318.*

The author gives a detailed report of a case which he treated from a half hour after the accident until healing was complete. The patient, a woman, was at work in the laboratory of a chemical plant when some of the solution spurted into her eye. She was not wearing the protective goggles which are required by the management. There was at hand sodium chloride which might have been used to neutralize the acid; instead she went to the factory clinic, thus delaying treatment for seven minutes. She was then referred to the author for further treatment.

A detailed description, with illustrations, is given of the condition of the eye as it presented itself from time to time during treatment, covering a period of about four months. This case verifies the writer's previous experience with mucous membrane plastic surgery. The implantation of even large sections of mucous membrane from the lips can be most earnestly recommended.

The author emphasizes the facts that compulsory wearing of suitable protective goggles cannot be too strictly enforced, and that employees

must be continually reminded where they can receive first aid.—A. W. N.

LEAD POISONING IN THE MINING OF LEAD IN UTAH. *A. L. Murray. U. S. Bur. Mines, Tech. Paper 389, 1926, pp. 40.*

The author concludes that lead poisoning contracted in the mining of lead ores is much more common than has been believed, practically all the cases being contracted through inhaled lead dust. The carbonate ores are the most frequent cause of lead poisoning, but the sulphide ores may cause poisoning when mined dry in poorly ventilated places.

The means recommended for reducing lead poisoning in mining are efficient ventilation, wet drilling, and the sprinkling of muck piles before loading. Proper medical supervision will do much to prevent the development of the chronic cases of lead poisoning which have been common in the past.—M. C. S.

LEAD AND GASES IN THE MANUFACTURE OF LEAD STORAGE BATTERIES. *E. Wigdortschik and E. Kupriz. Gigiena Truda, 1926, no. 9, pp. 19–26.*

The investigation of storage battery factories in Leningrad showed the following:

In the manufacture of storage batteries the workers continuously come in direct contact with lead. Examination of the hands showed, before washing, 1,040 and 3,011 mg. in the pasting department (*Bestreichungsabteilung*), 480 mg. in lead grinding (*Bleimühle*); after washing, 17 mg., 103.5 mg., etc. In all departments, in tests of deposited dust, lead was shown to be present in quantities varying from 1.1 to 99.25 per cent.; the highest percentages were found in the following processes: pasting department (62 to 80 per cent.), lead grinding (24 to 99 per cent.), cutting of lead plates (24 to 80 per cent.); in tests of the air of workrooms where lead was handled, lead dust could be shown to be present in quantities from traces to 79 mg.

Microscopic examination showed that the dust is extremely fine, especially in work with lead compounds; most dust particles were smaller than 4 microns. Examination of the cotton wadding filter of an ordinary, long imperfect respirator, after being used two hours by a worker at the lead mill showed 18 mg. of lead; after one hour at cutting formed plates without an exhaust, 93.8 mg.; at the same work at a worktable equipped with an exhaust, barely 4.4 mg. of lead. The authors especially call attention to the fact that the sanitary measures carried out in one of the factories investigated, such as the drawing off and removal of the dust, isolation of the workplaces in which dusty processes are carried on, suitable arrangement and maintenance of workrooms, and measures for care of the personal health of the workers, substantially lowered the danger of poisoning. Thus the percentage of those ill with lead colic in this sanitary factory in the course of three years amounted to 7.9 for an average working force of 300 persons and exhibited a tendency to decline; while in another less well-regulated factory the percentage of those ill with lead colic in two years and three months, for a working force of 120 persons, amounted to 30.8.

The department for scientific re-

search in the Leningrad labor office drew up a plan for a gradual replacement of lead storage batteries with alkaline batteries; until the working out of this plan, measures for the sanitation of lead storage battery plants must be applied.—B. A.

TOLERANCE IN RESPECT TO THE MENINGOCEREBRAL MANIFESTATIONS OF ACUTE AND SUBACUTE LEAD POISONING. EXPERIMENTAL PRODUCTION. *C. V. Weller. Abstr. as follows from Arch. Int. Med., Jan., 1927, vol. 39, pp. 45–59, in Jour. Am. Med. Assn., March 26, 1927, vol. 88, p. 1032.*

The results of Weller's work constitute a demonstration of experimentally induced tolerance to lead poisoning in respect to the meningocerebral manifestations as they occur in the guinea-pig.—K. R. D.

THE CHARACTER OF LEAD POISONING: II. EFFECT OF LEAD ON THE ISOLATED HEART OF WARM-BLOODED ANIMALS. *A. M. Breitburg. Gigiena Truda, 1926, no. 9, pp. 13–18.*

On the basis of experiments on the isolated heart of rabbits and guinea-pigs, to which solutions of lead nitrate and lead acetate were administered through the coronary vessels, the author comes to the following conclusions:

1. Lead always causes changes in the heart action which take the same course in two phases: The first phase corresponds to the stimulation of the sympathetic nerve ends; the second to their inhibition.

2. Besides the phenomena mentioned, in warm-blooded animals, with the development of the second phase, a high grade contraction of the coronary vessels occurs. It is very apparent that this contraction hastens the onset of diastolic cardiac arrest. Since this is a completely irreversible process, no possibility is offered that the heart action can be restored through subsequent perfusion by pure Tyrode's fluid.

3. The warm-blooded heart is less sensitive to the influence of lead than is the frog's heart. In the former all phenomena develop much more slowly (about in the course of an hour) and a somewhat stronger concentration of the poison is necessary (1:500,000 to 1:600,000 as against 1:1,000,000 with the frog). Among the warm-blooded animals the rabbit's heart is more resistant than the guinea-pig's.—B. A.

STUDIES IN ACUTE PHOSPHORUS POISONING. *P. C. Kiang. Abstr. as follows from China Med. Jour., 1926, vol. 40, pp. 1091–1100, in Bull. Hyg., Aug., 1927, vol. 2, pp. 625–626.*

The occurrence of phosphorus poisoning has been synchronous with the use of yellow phosphorus in the manufacture of lucifer matches, and has disappeared with its abolition. In China, however, yellow phosphorus matches are still easy to obtain, while cases of phosphorus necrosis occur in factory work, and suicides, which far exceed the factory cases in number, result from eating match heads. Phosphorus is comparatively slowly absorbed from the alimentary canal; hence, emetics, gastric lavage, and cathartics may be of value; potassium permanganate is a useful wash. Liquid petrolatum is suggested as an unabsorbable solvent. Later, alkali therapy and insulin-glucose may be of

value. A simple test is described in which a marine sponge is soaked in material suspected to contain free phosphorus and then squeezed out. If phosphorus is present, white fumes appear.

DUST HAZARDS AND THEIR EFFECTS

A NEW SOURCE OF TOBACCO DUST. *Holtzmann. Zentralbl. f. Gewerbehyg., Oct., 1926, N. S. vol. 3, pp. 272–273.*

The demand for light-colored cigars has brought about the use of artificial coloring processes through which a new source of tobacco dust and the consequent hygienic disadvantages have arisen.

The author describes the usual methods of obtaining this coloration, by bleaching with hyperoxide, and by powdering with finely ground tobacco. The former process is unobjectionable. It removes some of the nicotine. The latter method causes a notable increase in the amount of floury dust in the atmosphere, about the machines, and on the workbenches of the factory. The workmen suffer severe irritation of the eyes and of the respiratory mucous membrane. Much of this powder clings to the cigars and passes into the mouth of the smoker.—A. W. N.

DUST CONTENT OF AIR IN THE TEXTILE FACTORIES OF KHARKOV AND MEASURES FOR DUST PREVENTION. *A. Silbernik and M. Saizew. Gigiena Truda, 1926, no. 9, pp. 42–51.*

The authors have examined the air of three woolen factories in Kharkov for dust content. Wool and woolen rags are brought here to have the dust beaten out of them and to be unraveled.

The air of the rooms where the material is prepared contains the most dust: at the machine for getting dust out of the rags, where combined with material, 196 mg. in 1 cu. m. of air; at the machine for unraveling, 45 to 50 mg.; at the machine for mixing, where unloaded, 119 mg.; at the wool carding machine, 120 to 136 mg.; etc. This dust contained in addition to wool fibers various admixtures of mineral origin.

The authors recommend a series of measures for reduction of dust formation and for dust removal: washing of the rags, long-continued washing of the wool, changes in construction of the machines for getting the dust out of the rags and for unraveling, equipment of the machines for unraveling and mixing and of the sorting tables with a ventilation contrivance devised by them, and other measures.

After they began to work with wool which had been carefully beaten out and well washed, the amount of dust produced decreased considerably, as was proved by subsequent examination (at the wool carding machine, to about one-fourth or one-fifth).—B. A.

OCCUPATIONAL INFECTIOUS DISEASES: OCCURRENCE, TREATMENT, AND PREVENTION

CASE OF ANTHRAX. *R. Clément and C. Dausse. Abstr. from Progrès méd., 1926, no. 19, p. 724, in Rev. d'hyg., April, 1927, vol. 49, pp. 292–293.*

Description is given of an instructive case which may be classified between the two great classic types, the malignant edema and the escharotic malignant pustule. Although seriously affected, the patient, who was wool carder in a mattress factory, recovered perfectly and rapidly under the anti-anthrax serotherapy. Besides the precautions to be taken in the handling of skins and wool, the authors advise the vaccination of subjects particularly exposed.—B. A.

ANKYLOSTOMIASIS AS AN OCCUPATIONAL DISEASE. *H. Bruns. Zentralbl. f. Gewerbehyg., Nov., 1926, N.S. vol. 3, pp. 302–308; Dec., 1926, pp. 326–332.*

PULMONARY TUBERCULOSIS DUE TO OCCUPATION. *Von Schnizer. Med. Klin., Oct. 1, 1926, vol. 22, p. 1534.*

OCCUPATIONAL AFFECTIONS OF THE SKIN AND SPECIAL SENSES

CHANGES IN THE SKIN AND NAILS IN FEMALE GLAZE POURERS AND DESIGNERS IN PORCELAIN AND FINE POTTERY FACTORIES. *J. Kavalerow and B. Kogan. Gigiena Truda, 1926, no. 9, pp. 51–54.*

In an examination of women glaze pourers in two porcelain and fine pottery factories, who worked with lead glaze, the following changes in the skin and nails were established:

The skin of the hands and forearms is very dry, somewhat rough, swollen, and pale rose colored, almost as if lightly powdered; in the folds of the skin one could see here and there particles of glaze which were firmly adhering and not removable by washing. Infected excoriations, very difficult to heal, localized eczema with swellings, and pigmented, healed scars were observed. The nails were very thin and brittle, with serrated edges; in some the nail showed lengthwise cracks and under the nails painful fissures with thickened edges. In the majority of cases the furrows were closed up at the terminal phalanges; in four women workers the furrows were entirely absent. No relation could be established between symptoms of lead poisoning and the skin affection.

In the decorating department, where the women designers work with colors thinned with turpentine which covers their fingers and hands, while the whole room is saturated with turpentine fumes, skin affections could likewise be established, especially of the fingers, in the form of acute dermatitis, fissures, and ulcerations. All the designers were of pale complexion, and complained of headache and cough. The decorators were likewise ill.

After washing of the molds with turpentine by the women workers was forbidden and one special person who had to wear rubber gloves was assigned to the work, the illnesses ceased.—B. A.

ON THE QUESTION OF SO-CALLED NICKEL RASH. *H. Kolzoff. Zentralbl. f. Gewerbehyg., Dec., 1926, N.S. vol. 3, pp. 339–340.*

Fifty-six men and women who were employed in galvanoplastic nickel workrooms were examined at the Institute for the Study of Occupational

Diseases in Leningrad. The object of the study was to determine to what extent the rash affects workers in the different departments and, if possible, to determine the etiology. Of the total number examined twenty-three, or 41 per cent., had various skin diseases on the hands and the face.

The total number examined was divided into three groups: (1) those performing the work preparatory to nickeling—that is, cleaning the articles with petroleum, benzine, lime, and potash; (2) those who prepared articles for nickeling and who also did nickeling; and (3) those who worked only at the nickeling. In the first group there were 18 women, in the second, 31 women, and in the third, 7 men. Skin diseases were observed in 10 (56 per cent.) of the 18 women in the first group; in 12 (39 per cent.) of the 31 in the second group; and in only 1 (14 per cent.) of the 7 men in the last group. Omitting the third group which consisted of men, whose skin might be considered less susceptible, a comparison of the other two groups was made. It was found that the skin affections were more severe in the first group than in the second—a fact which suggests that the cleaning agents play an important part.

A further division of the cases into dermatitis and eczema showed that eczema was most frequent in the second group; was rare in the first group; and was absent altogether in the third group. Excluding group 3, the greater incidence of eczema in the second group suggests that nickel is the injurious agent. Obviously the cleaning agents dry the skin and make it more susceptible to nickel. While in the first group the eczema affected only those parts which came in contact with the irritant, in 5 out of 7 in the second group the skin of the face was also affected. According to all appearances, therefore, we have here not only a local but a general effect of the nickel.

Relation of illness to length of employment was also studied. Women who had been employed for not more than two months were all affected with skin diseases; among those employed from three months to one year there was a sudden drop in incidence to about 35 per cent.—a level which was maintained up to ten years' employment.

Finally the question as to why skin diseases rarely occur in men working with nickel was considered briefly. The author is inclined to believe that this is not explained by the lesser susceptibility of the skin of men to skin diseases but rather is due to the fact that nickel affects the skin only after it has been rendered more susceptible by cleaning agents. It is suggested that the matter might be decided by studying a group of men who work with materials which take the natural oil out of the skin as well as with nickel.—M. C. S.

HEALTH HAZARDS IN THE RUBBER INDUSTRY. *G. Haupt. Zentralbl. f. Gewerbehyg., Dec., 1926, N.S. vol. 3, pp. 332–333.*

The author refers particularly to the skin diseases suffered by the workers in tire factories who dip by hand into rubber solution the fabric on which the strips of rubber are stuck. Cracks appear on the inside of the hand and eruptions on the hands, forearms, face, and upper part of the body. These disturbances are more frequent at some

times than at others, partly owing to the fact that the solution is not always the same, and partly owing to individual idiosyncrasy. The recent addition of American lampblack to the mixture to color the tires has increased the incidence and the severity of the skin affections. Rubber gloves are sometimes worn but they do not overcome the difficulty.

The author suggests that the mixture should be investigated, especially the solvent, and if the injurious agent can be determined it should be removed and a guaranteed, uniform solution adopted. Better still would be to make the process mechanical.—M. C. S.

IRRITATION OF THE SKIN FOLLOWING WORK WITH TEAKWOOD. *H. Hoffmann. Zentralbl. f. Gewerbehyg., Dec., 1926, N.S. vol. 3, pp. 333–338.*

The author begins with a discussion of various kinds of teakwood and their industrial uses and reviews literature relating to the irritant action of teakwood on the skin. He then describes in detail his own investigation of six workers who suffered from irritation of the skin as a result of contact with teakwood. Tests were made on these workmen with teak dust and various teak extracts (alcohol, ether, chloroform, etc.) in order to determine definitely whether the teakwood was responsible for the symptoms. The skins of these men were not found to be oversusceptible to a number of substances which are known to have an irritant effect.

Tests were also made on a group of 100 persons with healthy skins. Only thirty-eight of the group were entirely without symptoms of irritation when teak dust was applied to their skins for twenty-four hours.

On the basis of the literature reviewed and of his own experience Hoffmann concludes that "East Indian teakwood from *Tectona grandis*, particularly when fresh, apparently contains a substance which has an irritant effect on the skin in a great many people. This substance is apparently free unsaturated resinic acid. Teakwood dust is especially irritating to the skin."

The conditions of the experiments which Hoffmann performed were much more severe than conditions encountered in industry; consequently there is not so large a number of workers actually suffering from skin irritation as his experimental results would lead one to expect (in Breslau among 616 teakwood workers only sixteen suffered ill effects).

With regard to treatment, Hoffmann has found that a soothing application to quiet the itching causes the symptoms to disappear rapidly. As prophylactic measures he suggests the wearing of leather gloves, exclusion of oversusceptible persons from work with teakwood, removal of teak dust from workplaces, frequent washing of the hands and face, and change of clothes after work.—M. C. S.

OCCURRENCE AND PREVENTION OF INDUSTRIAL ACCIDENTS

ACCIDENT STATISTICS AND ACCIDENT PREVENTION AT THE BROKEN HILL ASSOCIATED SMELTERS PTY. LTD., PORT PIRIE, SOUTH AUSTRALIA. *G.*

Dey. Abstr. as follows from Health, Commonwealth of Australia, Sept., 1926, vol. 4, pp. 130–137, in Bull. Hyg., April, 1927, vol. 2, p. 326.

The officer in charge of industrial hygiene at Port Pirie describes in this preliminary article the system adopted for recording accidents by the Smelter Company. Copies of seven forms in use are given. They indicate how the system tends to expedition and ease in extracting information, and to conciseness in keeping records. Not the least interesting form is the personal register intended to bring out the existence of any individual predisposition to sustain accidents with greater frequency than the standard. The system adopted would appear to be well suited to its purpose, but it has only been in operation for a short period, since September, 1925. Later information as to the results obtained from its use will be acceptable.

ACCIDENTS DUE TO EXPLOSIVES IN METAL MINES OF THE SOUTHWEST, AS SHOWN BY RECORDS IN ARIZONA. *E. D. Gardner. U. S. Bur. Mines, Tech. Paper 400, 1926, pp. 29.*

A study of the accidents described in this paper leads to the following conclusions:

1. Most explosives accidents are preventable. 2. The responsibility for the prevention of explosives accidents rests jointly upon the mining companies and the men using the explosive. The companies must properly plan the operations, provide proper equipment, and establish an adequate inspection service, and the men must use care and common sense in handling the explosive. Although safety inspectors can not visit all working places at blasting time, they should make periodical inspections. The companies should formulate plans and rules for the elimination of accidents from explosives and insist that the rules be enforced rigidly at all times. 3. Inexperienced men, even those who do not have to handle explosives underground, should be properly instructed in the hazards of explosives and detonators. 4. If explosives accidents happen frequently at any one place possible modifications of the mining system should be considered, even though each individual accident is due to carelessness or violations of rules. Mining systems should be made as nearly "foolproof" as possible; and all operations should be conducted in such manner that the opportunities for carelessness to cause accidents will be minimum.

—P. D.

ACCIDENTS IN THE PETROLEUM INDUSTRY OF OKLAHOMA, 1915–1924. *H. C. Fowler. U. S. Bur. Mines, Tech. Paper 392, 1926, pp. 29.*

COKE-OVEN ACCIDENTS IN THE UNITED STATES DURING THE CALENDAR YEAR 1925. *W. W. Adams. U. S. Bur. Mines, Tech. Paper 408, 1926, pp. 40.*

COAL-MINE FATALITIES IN THE UNITED STATES: 1925. *W. W. Adams. U. S. Bur. Mines, Bull. 275, 1926, pp. 129.*

RECORD OF INDUSTRIAL ACCIDENTS IN THE UNITED STATES TO 1925. *U. S. Bur. Labor Statistics, Bull. No. 425, Jan., 1927, pp. 113.*

PROCEEDINGS OF THE INDUSTRIAL ACCIDENT PREVENTION CONFERENCE HELD AT WASHINGTON, D. C., JULY 14–16, 1926. *U. S. Bur. Labor Statistics, Bull. No. 428, Sept., 1926, pp. 169.*

After emphasizing the utility of safety museums in manufacturing

cities, the conference was largely devoted to the matter of accident statistics, the necessity of national statistics, and the close relation between accident prevention and accurate accident statistics.—B. A.

MACHINE GUARDS IN PRACTICE. *H. Gärtner. Zentralbl. f. Gewerbehyg., Oct., 1926, N. S. vol. 3, pp. 271–272.*

The writer, while emphasizing the urgency of providing machine guards wherever needed, points out that the trade-unions frequently make excessive demands for such protection. He cites the instance of one union demanding that *all* ventilators, regardless of their position, be provided by the manufacturer with guards.

In the case of grinding machines, the writer claims that the demand that all guards be made of wrought iron is likewise unnecessarily severe. He recommends that up to a certain size grindstones may be provided with cast-iron guards which are equally serviceable and appreciably cheaper.—A. W. N.

INTENSIVE MEDICAL SUPERVISION IN THE METAL TRADES. *J. A. Turner. Nation's Health, April, 1927, vol. 9, pp. 28–30.*

The three factors chiefly concerned in the reduction of absenteeism on account of accidents are: application of safety devices, education in safety, and effective treatment of all injuries regardless of how trivial they may be. These methods are also applicable to reducing sickness rates. Data are here presented covering a period of six years, on accidents and sickness in the Laidlaw Works of the Worthington Pump and Machinery Corporation. It is found that diseases of the respiratory tract have caused four times as much time loss as accidents.—M. M.

EYE ACCIDENTS AND THEIR CAUSES. *J. E. Hannum. Indust. Psychol., Sept., 1926, vol. 1, pp. 589–595.*

In the use of goggles for effective eye protection, provision should be made for corrections of defective vision; "experience has demonstrated that where defective vision exists, objections to wearing goggles are overcome when the goggles are fitted with lenses which correct the eyes. It is always essential that the goggles be of a suitable design and fitted to the face of the individual workman so as to afford the greatest possible degree of comfort."

A brief review is given of data which have been gathered by different agencies with regard to the severity of eye hazards and the cost of industrial eye accidents. Eye hazards and the means of protection are discussed, using as a basis the classification given in the "National Safety Code for the Protection of the Heads and Eyes of Industrial Workers." Flying objects constitute the most serious hazard, while other causes of injury are foreign bodies which may find lodgment in the eye—such as dust, emery, pieces of metal, etc.—splashing molten metal, burns from acids and alkalies and other industrial poisons, and various kinds of radiant energy. Tinted glass may be necessary for protection from reflected light or glare in goggles used in certain occupations and for protection from ultraviolet and infra-red rays; and a hood or helmet may be necessary to protect the face and head in connection with the goggles for protecting the eyes.—B. A.

INDUSTRIAL SURGERY

SURGICAL ADVANCES DEVELOPED DURING THE WAR APPLICABLE TO INDUSTRIAL SURGERY. *J. W. Vaughan. Jour. Michigan State Med. Soc., Oct., 1926.*

This article is based on an exhaustive review of the literature pertaining to the treatment of wounds during the World War. The author considers that the three advances of preeminent value developed during the war are: the proper surgical cleansing of wounds, a procedure termed *debridement* by the French; the mobile treatment of joint infections; and the demonstration of the value of the prophylactic administration of antitetanic serum. Each of these points is discussed and a bibliography of 175 references is given.—M. C. S.

INDUSTRIAL PHYSICAL THERAPY. *J. S. Coulter. Arch. Physical Therapy, X-Ray, Radium, Jan., 1927, vol. 8, pp. 10–16.*

This is a review of the uses of physical therapy, in which the author emphasizes the fact "that physical therapy has some definite indications and that the lack of physical therapy in the treatment by many physicians delays the recovery of these cases." The choice of methods must be based on a complete physical examination and diagnosis of the patient's condition and on a thorough understanding of the effects of physical means.—M. C. S.

DISCUSSION ON THE TREATMENT AND RESULTS OF FRACTURES OF THE UPPER END OF THE FEMUR IN ADULTS (EXCLUDING THE SHAFT). *S. L. Higgs. Proc. Roy. Soc. Med., Feb., 1927, vol. 20, pp. 441–453 (Orthopaedics, pp. 11–23).*

APPRENTICES' SCOLIOSIS. *H. Richter. München. med. Wchnschr., Oct. 1, 1926, vol. 73, pp. 1655–1656.*

The term "apprentices' scoliosis" was first introduced by Schanz in 1911, and was more accurately defined by Elsner the following year. Since then the separation of this form of scoliosis from the other forms has found general recognition in the orthopedic literature. The name has come to signify scoliosis among young people who during their school years had either a normal form of spinal column or, at the most, a very slight curvature that showed no tendency toward increase, and who, after engaging in some occupation requiring severe physical labor, have become scoliotic. To these occupations belong not only the standing but likewise all those sitting occupations in which the arms must be held free and in which the vertebral column must carry the burden of the arms and shoulders and cannot be relieved by leaning on the arms, as, for instance, in writing.

There are two kinds of characteristics of this disease: first, the tendency to a rapid progress of the curvature even to the highest degree; and second, the distinct appearance of *Insufficientia vertebrae Schanz*, a condition that frequently appears simultaneously, though sometimes presents itself hurriedly in advance, giving premonition of the curvature.

Statistics from Dr. Schanz' Orthopedic Hospital in Dresden are quoted

for January to March, 1926, which show that among a total of about 650 entries there were nineteen cases of apprentices' scoliosis—almost 3 per cent. It is the author's opinion that there has been an increase in the frequency of this disease, possibly due to undernourishment during the war period, and that more attention should be given to these cases. The earlier the treatment is begun, the more can be accomplished; therefore especial attention should be given to prophylaxis. Two points in particular should be observed: First, everybody serving on vocational guidance boards, primarily the school physicians, should see that persons with spinal weakness are kept out of occupations such as those mentioned above. Second, all persons with pain in the back and with incipient spinal curvature should be given serious attention from the beginning and should be given work that is harmless for them.—A. W. N.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THE SO-CALLED ACTION OF ACID SODIUM PHOSPHATE IN DELAYING THE ONSET OF FATIGUE. *F. B. Flinn. U. S. Pub. Health Rep., July 16, 1926, vol. 41, pp. 1463–1476.*

The author summarizes his results as follows:

1. The impossibility of determining a base line from which to judge fatigue in an animal seems fairly well established.
2. The benefits derived from ingesting acid sodium phosphate appear to depend on its stimulating action on the intestinal tract.
3. The ingestion of acid sodium phosphate does not appear to increase muscular efficiency.
4. The feeling of well-being experienced by the group which was studied to determine the general physiological effects of the salt was probably, in part, due to increased elimination of body wastes.

NERVE FATIGUE DURING MODIFIED WORK. *I. Beritoff. Gigiena Truda, 1926, no. 9, pp. 3–9.*

The author especially observed fatigue of the nerve fibers and in particular the nerve tracts of the co-ordinating apparatus of the brain and spinal cord and of the sensory regions situated in the cerebral cortex. The nerve fibers did not once become fatigued in long-continued activity so long as this occurred under conditions of normal blood supply, *i.e.*, under the normal course of all nutrition and oxidation processes. On the other hand, the co-ordinating apparatus became fatigued very quickly, the more quickly the stronger the cortical impulse setting it in motion and the shorter the rest pause after each movement of work. The fatigue of the cerebral cortex is conditioned, under ordinary circumstances, by the fatigue of the co-ordinating apparatus. During unusually strained mental work, however, the cerebral cortex becomes fatigued independently of the fatigue of the co-ordinating apparatus and especially of the work mechanism. Modified work in an occupation presumes always the activity of the muscular apparatus as well as of the nervous system. As a result the brain in long-continued work becomes fatigued not only under the influence

of those products which form in the brain itself but also under the influence of the acid products forming in the muscles reached by the central nervous system. If the work is chiefly mental, the brain fatigue depends principally on its own activity; *i.e.*, the cerebral cortex is fatigued principally. The author comes to the conclusion that the fatiguing activity of the muscular apparatus exercises a much more severe effect on the brain than does that of the brain itself.—B. A.

ON THE DESIGN OF MACHINERY IN RELATION TO THE OPERATOR. *L. A. Legros and H. C. Weston. Indust. Fatigue Res. Board, Rep. No. 36, 1926, pp. 32.*

A MEDICAL ASPECT OF MINERS' SHORTER HOURS. *Brit. Med. Jour., Nov. 13, 1926, vol. 2, p. 906; Dec. 11, 1926, p. 1145.*

In the first communication Dr. G. Arbour Stephens calls attention to the harmful effects of the seven-hour day as compared with the nine-hour day formerly worked by miners. He concludes that the seven-hour day is more exhausting to the men because they do not stop for any rest or to take food underground, and suggests that the resulting heart and nerve troubles (such as nystagmus) explain why many colliers at 50 years of age give up under daywork and seek piecework.

Dr. F. G. Bushnell, in the second communication, gives another aspect of the seven-hour day for miners—namely, that following the reduction of working hours in 1919 there was a reduction in all accidents, until 1922 when the wages were lowered resulting in weakened endurance in the men and consequent increase in accidents. He concludes therefrom that both lower wages and longer hours lower the average physical condition.—B. A.

A RÉSUMÉ, WITH COMMENTS, OF THE AVAILABLE LITERATURE RELATING TO POSTURE. *L. Schwartz. U. S. Pub. Health Rep., May 6, 1927, vol. 42, pp. 1219–1248.*

This article, while chiefly of general interest, has a bibliography of 154 references, many of which relate to the industrial phase of the question.

HAZARDS OF COMPRESSED AIR, DIMINISHED PRESSURE, GENERATION AND USE OF ELECTRICITY, AND ELECTRICAL WELDING

RESCUE WORK IN ELECTRIC ACCIDENTS. *S. Jellinek. Abstr. from Mitt. d. Volksgsndhtsamte, Vienna, Nov. 30, 1926, pp. 289–290, in Bull. Hyg., April, 1927, vol. 2, pp. 325–326.*

The writer maintains that the functional disturbances which arise from shock and terror affect the action of the electric current. A person on the alert can bear an electric shock better than one taken unawares.

It is maintained that rescue work often fails because it is not properly done and that the workmen who have to do it until the arrival of medical help are not properly trained. The superiority of the Silvester method is dwelt on and an experiment on a

human dead body is described and illustrated, in which cannulas were inserted into the femoral artery and femoral vein and connected with manometers; on then employing the Sylvester method it was found that the pressure in the artery increased during each artificial inspiration with a corresponding diminution of pressure in the vein.

The advantage of having the patient on a small table instead of on a form or on the ground is pointed out, as the arms can then be stretched below the level of the table in a much wider sweep and the operator can work with less fatigue in the standing position than in any other. Elastic armlets have been devised for attachment above the elbow of the patient and these are provided with places to insert the fingers.

Among the further measures which can be adopted by medical men are lumbar puncture, intracardial injections of lobelin and other preparations, and faradism of the phrenic nerve which has been successfully used by Dr. Zangger.

It is suggested that in electric works the men should all be thoroughly trained in rescue work and that boxes containing various necessary articles should be kept handy.

All rescue work should be uniform in all countries and it is recommended that the matter be dealt with by an international commission composed of doctors and engineers in accordance with the example of the Geneva Red Cross Convention.

THE SKIN CHANGES IN CASES OF DEATH FROM ELECTRIC CURRENT. *G. Strassmann. Abstr. as follows from Ztschr. f. Med.-Beamte u. Krankenhausärzte, 1926, no. 12, in Zentralbl. f. Gewerbehyg., Jan., 1927, N. S. vol. 4, p. 27.*

The author emphasizes the importance of cutting out for microscopic examination the so-called "current marks" in persons who have been killed by electric current. These current marks present small, bluish discolored, often unsightly skin depressions, sometimes with hard, somewhat raised edges. The microscopic picture is characteristic and often of greatest importance in differential diagnosis. The microscopic picture is: compression of the endothelial layers, especially the horny layer; formation of vesicles in the horny and germ layers; cracking and uncovering of parts of the tissue chiefly under the germ layer, like a spine and spindle shaped elongation of the cells and nuclei of the germ layer in varying degree up to a state where the cell picture is completely irrecognizable.—M. C. S.

INDUSTRIAL AND DOMESTIC ACCIDENTS FROM ELECTRICITY. *A. Zimmern. Bruxelles-Méd., Oct. 3, 1926, vol. 6, p. 1461.*

HEAT, COLD, AND HUMIDITY

DEEP LEVEL MINING AND HIGH TEMPERATURES. *A. Mavrogordato and H. Pirow. Jour. So. African Inst. Eng., Feb., 1927, vol. 25, pp. 101–124.*

This report describes four mortali-

ties, presumably from heat stroke, in the Village Deep Mine. The probable causes of death are discussed and preventive measures suggested. Since the victims were all boys who were working for the first or second time in hot places, their sudden collapse must have been partially due to lack of acclimatization to the severe condition. Mine operators are cautioned against allowing men to work in hot temperatures until they have become gradually acclimatized to the condition.

The wet kata cooling powers at which heat stroke occurred varied from 7.4 to 4.5 millicalories per square centimeter per second. The corresponding effective temperature limits are 85.6° to 99°F. These values are greatly in excess of what is considered satisfactory in mines, *viz.*, a wet kata cooling power of 16, or an effective temperature of 80°F. Methods for reducing these temperature levels are suggested; air movement and cold water sprays are recommended in particular, although their shortcomings are fully recognized.

It has been difficult, on account of the water sprays used to allay the phthisis producing dust, to keep the wet bulb temperature down to the safe level. If dust concentrations could be kept at their present level without the use of water, both the phthisis and the temperature problems might be satisfactorily dealt with, at least in the Witwatersrand.

In the appendix, the authors point out that the results obtained by wet kata in South Africa are very similar to those obtained by the effective temperature index in the United States.—C. P. Y.

THE RELATION OF ATMOSPHERIC CONDITIONS TO THE WORKING CAPACITY AND THE ACCIDENT RATE OF COAL MINERS. *H. M. Vernon, T. Bedford, and C. G. Warner. Indust. Fatigue Res. Board, Rep. No. 39, pp. 32. H. M. Stationery Office, 1927.*

The work of coal getting is arduous, and the temperature conditions in mines are often unfavorable; hence the industry presents a useful field for investigating human activity. An inquiry carried out by Dr. H. M. Vernon and T. Bedford is now reported upon. They took as their measure of the influence exerted by atmospheric conditions (*a*) rest pauses taken from work by the men and (*b*) the time taken to fill tubs with coal. They found that, when the cooling power of the air as measured by the kata-thermometer was favorable, the men rested less and worked faster than when the cooling power was less. The variations found were from 7 minutes per hour to 22.5 minutes per hour in the total rests taken, and from 8 minutes to 9.6 minutes in filling tubs. The rate of production is calculated to be 41 per cent. less under the most adverse atmospheric conditions found than under the most favorable ones. The question is discussed as to how atmospheric conditions can be improved, the object being to increase the cooling power by additional air movement. The problem is one for ventilating engineers to solve. The accident rate was found to be influenced by atmospheric conditions in the same way that working activity was—that is to say, the worse the conditions physiologically, the greater was the tendency to sustain accidents and the longer did it take to recover

from accidents. Both accident rate and accident severity were lower when the cooling power of the air was best. Reasons are given for considering that the health of the miners varied in the same way with atmospheric conditions. The whole report is one of considerable interest and a valuable contribution to the study of human activity and fatigue.—E. L. C.

REVIEW OF LITERATURE ON THE PHYSIOLOGICAL EFFECTS OF ABNORMAL TEMPERATURES AND HUMIDITIES. *R. R. Sayers and S. J. Davenport. U. S. Pub. Health Rep., April 8, 1927, vol. 42, pp. 933–996.*

This is a very comprehensive review with a bibliography containing 139 references.—P. D.

WOMEN AND CHILDREN IN INDUSTRY

WOMEN IN MISSISSIPPI INDUSTRIES. A STUDY OF HOURS, WAGES, AND WORKING CONDITIONS. *U. S. Dept. Labor, Women's Bur., Bull. No. 55, 1926, pp. 89.*

This survey covered twenty-five cities and towns, and included 2,853 women employed in factories, stores, and laundries—eighty-one plants in all. Over two-thirds of the women were engaged in manufacturing, practically one-fifth in stores, and the rest worked in laundries. Not far from one-fifth of the women workers surveyed were negroes.

Over one-third of the women employed in these plants were expected to put in a regular working day longer than ten hours, although a state law limits the working day of women in practically all occupations except domestic service to ten hours. For over a fourth of the women sixty hours or more represented the normal weekly schedule. The median earnings of the white women were only $8.60 for the payroll week taken in January, 1925, and only a little higher for the week in January, 1924; the earnings of the negro women in the two periods were $5.75 and $5.90.

Working conditions left much to be desired. In eleven establishments there were no washing facilities; in almost half the plants no towels were provided although they had washing facilities; and eighteen factories provided common towels. In about one-fourth of the plants common drinking cups were found, while in others no cups were provided. Toilet conditions were most unsatisfactory, seven establishments reporting no toilet facilities for negro women. Service facilities were conspicuous by their absence; no lunch room was reported in sixty-nine establishments, no cloakroom in forty-five, and no rest room in sixty-seven.—B. A.

THE PSYCHOLOGY OF THE WOMAN WORKER. *S. Bevington. Jour. State Med., Oct., 1926, vol. 34, pp. 589–595.*

THE MARRIED WOMAN WORKER. *C. M. Murrell. Jour. State Med., Nov., 1926, vol. 34, pp. 660–662.*

OBSERVATIONS BY A FEMALE MEDICAL INSPECTOR OF FACTORIES. *K. Mackay. Abstr. as follows from Health, Commonwealth of Australia, Sept., 1926, vol. 4, pp. 137–140, in Bull. Hyg., April, 1927, vol. 2, p. 326.*

The drift of women into factory life, in pursuit of those occupations which were previously purely domestic, is leading to the establishment of female medical inspectors. The state of Victoria is the first in Australia to adopt this practice. The author of this article gives some account of the work which she has done, and is doing. She conducts medical examinations of 14 year old female children in order to permit them to work in factories before the age of 15, and also of physically unfit females for permission to work for less than the basic wage. She also investigates special industrial risks and the need for females of such welfare accommodation as seats, rest rooms, and dining rooms. Among the children, dental defects are widespread and are held responsible for much rheumatoid arthritis, gastric trouble, and impaired industrial efficiency; hence industrial dental clinics are held to be of economic value. Eye defects, often gross, were found numerous. The examination of children for industry should always have reference to ocular, oral, dental, and postural defects. Such preliminary examination is of national importance. Reference is made to certain special investigations which, however, brought to light no noticeable facts. Dr. Mackay stresses the necessity for adequate labor turnover figures, considering that therefrom evidence of great value concerning the health and comfort of any industrial establishment can be quickly obtained.

CRÈCHE, WITH PROVISION FOR BREAST FEEDING, AT A LARGE PARIS SHOP. *G. Letellier. Abstr. from Ann. d'hyg. pub., indust. et sociale, 1926, vol. 4, pp. 471–481, in Bull. Hyg., April, 1927, vol. 2, pp. 269–270.*

The author, a factory inspector, describes the facilities given to the women employed at the Grands Magasins du Louvre to suckle their babies in comfort on the premises. Such facilities are prescribed by an Act passed in 1917, but not made obligatory until 1926. By the generosity of Madame R. Donine, the so-called "pouponnière" of the Grands Magasins du Louvre was established in 1919. A plan of the institution shows that it comprises a dormitory for the younger babies, a dormitory for the older babies, a kitchen, dining room and breast-feeding room, an isolation room, the doctor's consulting room, and the necessary offices.

THE HEALTH OF THE WORKING GIRL, 14–16. *C. Murrell. Abstr. as follows from Jour. Roy. San. Inst., Nov., 1926, vol. 47, pp. 369–371, in Bull. Hyg., April, 1927, vol. 2, p. 327.*

The adolescent girl is peculiarly liable to certain disabilities, such as errors of spinal growth and anemia. Industry tends to accentuate such tendencies; thus, prolonged standing, or the assumption for hours of a bad position in a sitting posture, or weight carrying, may cause scoliosis; wrong stance may result in lordosis; and flat-foot may be due to wrong shoes. While chlorosis has almost disappeared, milder forms of anemia occur, due possibly to disturbance of menstruation, or to overwork from a girl having to assist in the home as well as to attend the factory, or to emotional strain. The outlook of the girl is to regard work as filling the interval between school age and married life, for which

purpose routine occupations with no scope for ambition are accepted. Hence the mental viewpoint of the girl in industry is less satisfactory than that of the boy. These points ought to receive consideration when industry takes over the adolescent girl, who has been trained during the school period for adult life.

SPECIAL INVESTIGATION OF CHILDREN IN INDUSTRY ATTENDING PART-TIME SCHOOL. *E. M. Rourke. Iowa Bur. Labor, Bull. No. 17, 1926, pp. 77.*

This investigation was undertaken in order to gain a more comprehensive knowledge of the reasons causing children to quit full time school between the ages of 14 and 16 years to go to work and of those causing other children to lose their jobs when they find them. The part time school was selected as the field of investigation because the working children in this age group must attend part time school, where such a school exists, under the part time school law. Schools of twelve cities were covered, comprising all such schools maintained in the state of Iowa, between March 1, 1925, and the end of the school term. Interviews were held with 210 girls and 175 boys, the data from which are given in two tables—the reasons for leaving school being given in the child's own language. Parental influence as shaped by economic, social, and moral conditions in their effect on home environment and consequent guidance of the child; the reaction of the child and his development of likes and dislikes of studies; the method of job finding and adaptation to the job, also the disparity of the job found with the child's real preference; in brief every element entering into the many problems of the gainfully employed child was made a part of the investigation.—B. A.

PHYSICAL DEVELOPMENT OF JOB-WORKING SCHOOL CHILDREN. *Y. Kose and S. Itani. Abstr. as follows from Japan Med. World, 1926, vol. 6, pp. 85–86, in Bull. Hyg., April, 1927, vol. 2, p. 277.*

The inspector of factories and a school physician have examined 1,683 schoolchildren in Nagoya. These were partly employed in job work at home. This work is straw plaiting, weaving or spinning, making toys, and sometimes metal or pottery working, for three to five hours daily. A few begin at 7 years, more at 8 or 9, and many by 10; more girls than boys are employed in the earlier years. The circumstances of the homes, as well as the work, tell on the physical condition. They were compared by measurements with the other 45,000 children in the schools; this showed that, except at the age of 7, the heights, weights, and chest circumference of both boys and girls was inferior to the others.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

VENTILATION ARRANGEMENTS IN UNHEALTHFUL DEPARTMENTS OF THE NAIL, WIRE, AND CHAIN FACTORY "INTERNATIONAL" IN SAPOROSHJE.

K. Mosgow. Gigiena Truda, 1926, no. 9, pp. 78–80.

The author describes, with illustrations, three arrangements for ventilation in the chain, etching, and galvanizing departments.—B. A.

FUNDAMENTALS OF ILLUMINATION. *W. Harrison and K. A. Staley. National Lamp Works of General Electric Co., Bull. 7-D, Engin. Dept., Jan. 1, 1927, pp. 60.*

In this bulletin the authors present in simple, concise form the following:

Part I. Fundamental Concepts
- Units of Measurement
- Table I—Reflection Factors
- Photometry
- Candlepower Distribution Curve
- Foot-Candle Measurements

Part II. Principles of Light Control
- Table II—Characteristics of Materials
- Polished-Metal and Mirrored-Glass Reflecting Surfaces
- Dull-Finished Metal Reflecting Surfaces
- Rough or Mat-Finish Reflecting Surfaces
- Clear Glass Surfaces
- Gloss Finish Paints
- White or Milk-Glass Reflecting Surfaces
- Porcelain Enamel Reflecting Surfaces
- Frosted-Glass Reflecting Surfaces
- Prismatic Refractors
- Prismatic Reflectors

Part III. Essentials of Modern Illumination
- Quality of Illumination (Glare, Shadows, Color)
- Quantity of Illumination
- Choice of a Lighting System

A series of exceptionally good photographs illustrate the section on principles of light control and bring out many practical features of transmission, absorption, and reflection of reflectors and enclosing glassware.—P. D.

INDUSTRIAL MEDICAL SERVICE: MEDICAL DISPENSARIES AND HOSPITALS IN INDUSTRIAL PLANTS

ADAPTATION OF THE MEDICAL PROFESSION TO CONDITIONS IN LARGE MODERN INDUSTRIES, OR THE RÔLE OF MEDICINE IN THE ORGANIZATION OF LARGE FACTORIES OF TODAY. *M. Stassen. Rev. d'hyg., Feb., 1927, vol. 49, pp. 95–108.*

Previous to the compensation act which came into force in 1905, no organization existed in the Liége district of Belgium for providing medical or surgical aid in the coal industry. Up to that date ankylostomiasis, beat knee and beat elbow, nystagmus, and frequent infection of even slight abrasions were of constant occurrence among the colliers. The author was called upon in 1906 to establish a dispensary and first aid work for a large group of collieries. The methods followed are described. All washing and disinfection of wounds underground are interdicted; dressings only are applied and the patients sent to the dispensary. Every effort is made to interest the miners in their own health, and to insure that they seek treatment for every wound, however trivial. Excellent results have been obtained. Thus, whereas in 1907, 25 per cent. of wounds were complicated by septic infection, the condition steadily improved until the percentage had reached 1 in 1921, and had fallen as low as 0.1 by 1925.

At the same time the mortality from

accidents had fallen from 2 per 1,000 workers in 1906 to 0.3 in the period 1919 to 1925, while in neighboring collieries, the mortality still remained at 1 per 1,000. Time lost from accidents showed a similar advantageous comparison, being in the collieries under medical supervision less than half that in the other group of collieries. The absolute benefit accruing from medical supervision is placed at 1,500,000 francs per annum. Further description is promised of the work done in regard to preventing sickness and maintaining general health. —E. L. C.

SELLING INDUSTRIAL MEDICAL DEPARTMENT ACTIVITIES. *C. H. Watson. Nation's Health, Jan., 1927, vol. 9, pp. 16–18.*

The supervisor in any department, in any plant, can best keep watch of the general health of his employees and refer them to the medical director, who obviously cannot go through the plant hunting up patients. Ways of creating interest in the medical department are health education of the personnel, councils in sickness problems, and examinations on return to work after illness.—M. M.

COOPERATIVE SIDE OF MEDICAL DEPARTMENTS. *H. S. Murat. Nation's Health, March, 1927, vol. 9, p. 56.*

The industrial physician has a great opportunity for co-operative service with the safety department of his institution; men are never so receptive to safety arguments as when they have met with a slight injury that might have been much more serious. The greatest place for co-operation, however, lies in the examination of new employees, where the responsibility rests on the medical man as to the physical fitness of the employee for the job.—M. M.

PHASES OF PHYSICAL EXAMINATION PROBLEMS IN INDUSTRY. *C. H. Watson. Nation's Health, March, 1927, vol. 9, pp. 30–31, 84.*

The examination may be divided into two phases: first, an objective inspection of the human machine showing how its actual gross anatomy and physiology is working as observed by modern methods and technic of observation; and second, a subjective and physiologic inspection, including living habits, mental abnormalities, phenomena, behaviorism, etc. From these two phases of examination the industry obtains information as to whether this particular human machine possesses parts, functioning with a degree of nicety that should make possible the proper performance of some particular job.—M. M.

THE HEALTH OF EXECUTIVES. *C. F. N. Schram. Abstr. from Bull. Am. Assn. Indust. Physicians and Surgeons, Feb., 1927, vol. 1, in Am. Jour. Pub. Health, April, 1927, vol. 17, p. 412.*

Men in executive positions lose less time from work, from all causes, than do the men who are paid on an hourly, daily, or piece work basis, even though the average age of executives is greater than that of the other group. When an executive shows lack of ability or efficiency, it is frequently due to a low grade infection or a developing pathologic condition. The physician in industry is trained and equipped to detect in a large majority of cases most of such pathologic con-

ditions in their incipiency, and through the medical department can maintain a high degree of health in executives. The value of this service should be made clear to the executive in industry.

A Short Résumé of Fracture Experiences at the Norton Company. *W. I. Clark. Boston Med. and Surg. Jour., Dec. 2, 1926, vol. 195, p. 1064.*

Cost and time lost in days are given for 127 fractures occurring in the ten years May, 1916, to May, 1926, in the Norton Company, Worcester, Mass., which employs an average force of 2,600, in the manufacture of abrasives, grinding wheels, and grinding wheel machines. Ambulatory fractures were treated at the factory dispensary by the factory medical staff; bed cases, at a local hospital.

The distribution of the fractures and the time lost in days is shown in the following tabulation:

	Number of Cases	*Days Lost Total*	*Days Lost Average per Case*
Skull	1	20	20
Face	2	24	12
Rib	9	202	22
Arm	3	135	45
Forearm	6	212	35
Wrist	2	42	21
Metacarpus	5	88	17
Finger	34	575	17
Pelvis	1	46	46
Femur	4	1,512	378
Leg	5	543	108
Metatarsus	3	201	67
Foot	15	558	37
Toe	37	702	19
	127	4,860	

The average loss of time, 38+ days per fracture, is high because it was considerably raised by two of the four femur cases—one a case of syphilis with spontaneous fracture, the other a case of fracture of the neck of the femur, in a very heavy patient. Both of these cases failed to unite and bone grafting was necessary.

The total cost during the ten years was $12,837.89, representing the amount paid to doctors outside the factory for special work, in hospital expenses, and in compensation paid the injured employee. The cost of the five fractures of the leg averaged $232+ per case, while the four fractures of the femur averaged $2,314+ per case, thus making a high average cost per case ($101.08) for the 127 fractures.

The return to work is earlier on the average than is to be expected in the average factory, because the "return to work means return to arranged work in the factory, which in many cases may be performed while apparatus is being worn."—B. A.

Hay Fever among Industrial Workers. *Abstr. as follows from Bull. Am. Assn. Indust. Physicians and Surgeons, Feb., 1927, vol. 1, p. 6, in Am. Jour. Pub. Health, April, 1927, vol. 17, p. 412.*

Dr. Guy L. Kiefer, medical director of the Michigan Bell Telephone Company, made a special study of 31 employees who were given free immunization with hay fever pollen (ragweed). Of the number treated, 29 showed improvement. Only 1 case reported no relief, and in this case the reaction from pollen injection was so great that the treatment was discontinued. In detail, 6 persons were entirely relieved, 11 were greatly improved, and 4 had the attack start with about the usual severity, but they

were much improved in a short time, the attack lasting only a little while. (The paper gives a tabulated statement of the results in each case.)

DENTAL SERVICE IN INDUSTRY. *T. P. W. Watt. Abstr. from Indust. Welfare, 1926, vol. 8, pp. 363-369, in Bull. Hyg., July, 1927, vol. 2, pp. 511-512.*

The dental clinic started by Cadbury Bros. in 1905 at Bournville was one of the first industrial dental clinics to commence work in Great Britain. This paper describes the work at this clinic. From the commencement the dentist in charge stressed the treatment of juniors with the idea of passing them out of his hands dentally fit at 16. At first there was much prejudice on the part of the parents against filling teeth. This was countered by the firm making it a condition of employment that all juniors should have whatever treatment the dentist considered necessary and that the parents or guardians should sign an authorization form. After that there was no trouble. Five years later it was proposed to raise the age limit for dental treatment from 16 to 21; there were no refusals from parents. The clinic was started with one dentist and a second was appointed in 1909. The war delayed further extension but in 1922 a third dentist was appointed and two dental mechanics. Even this staff is unable to cope with all the work for juniors under 18.

Watt states that about twenty-five large firms have started dental clinics. The methods adopted vary. In some the dentist is paid a salary; in others the dentists are part time and either paid on a time basis by the firm or charge the firm for work done at the approved scale agreed upon by the Approved Societies and the dental profession. Others collect the fees from the patients themselves, the firm providing facilities in the way of accommodation, etc. In some cases the firm pays the whole fee; in others it pays a proportion. As to the benefit of industrial dental clinics Watt speaks enthusiastically. Among 500 boys examined between 1909 and 1911 there were 1,000 visible cavities and thirty-eight fillings. In the same number of boys examined ten years later the visible cavities had fallen to 470 and the fillings risen to 254. There is a considerable controversy among dentists as to the merits of clinics versus panels as a means of providing dental benefit by the Approved Societies. Watt considers that clinics offer many advantages, chiefly on the score of cheapness and ease of arranging to see patients.

INDUSTRIAL PERSONAL AND COMMUNITY HYGIENE: HOUSING, ETC.

SOUTHERN COTTON MILL COMMUNITY HEALTH AND SOCIAL WELFARE. *R. G. Beachley. Nation's Health, Feb., 1927, vol. 9, pp. 57-58.*

The Pacolet Manufacturing Company has built a village for its employees, wherein each family occupies a separate, modern, attractive bungalow. The mill authorities employ a trained nurse who organized and has established a system of welfare work among the employees and their fami-

lies. A baby day nursery was founded where mothers who work in the mill may leave their children during the day under the supervision of a nurse and doctor. A physical examination clinic has been opened, the object being to give a thorough and complete physical examination to each adult in the village in an effort to reduce the death rate further and to protect the health of the employees. In addition a large community house is provided for recreation, with reading rooms, club rooms, baths, kitchens, and dining rooms.

A recent survey of the death rate of the Pacolet Mill Village shows it to be much lower than that of the state or the county.—M. M.

INDUSTRIAL INVESTIGATIONS AND SURVEYS

WAGES AND HOURS OF LABOR IN FOUNDRIES AND MACHINE SHOPS, 1925. *U. S. Bur. Labor Statistics, Bull. No. 422, Jan., 1927, pp. 159.*

WAGES AND HOURS OF LABOR IN THE MEN'S CLOTHING INDUSTRY, 1911 TO 1926. *U. S. Bur. Labor Statistics, Bull. No. 435, March, 1927, pp. 63.*

WAGES AND HOURS OF LABOR IN THE MOTOR VEHICLE INDUSTRY: 1925. *U. S. Bur. Labor Statistics, Bull. No. 438, May, 1927, pp. 114.*

WAGES AND HOURS OF LABOR IN THE IRON AND STEEL INDUSTRY: 1907 TO 1926. *U. S. Bur. Labor Statistics, Bull. No. 442, June, 1927, pp. 192.*

WAGES AND HOURS OF LABOR IN COTTON-GOODS MANUFACTURING, 1910 TO 1926. *U. S. Bur. Labor Statistics, Bull. No. 446, July, 1927, pp. 49.*

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

THE CLINICAL METHOD IN INDUSTRY. *M. S. Viteles. Indust. Psychol., Dec., 1926, vol. 1, pp. 753–758.*

The author defines the clinical method in industry as "a search for the job best adapted to the worker who, for one or another reason, has become maladjusted on a job originally chosen. In this sense adjustment becomes a problem of vocational guidance, and not one of vocational selection." The application of this method is illustrated with four case studies taken from an investigation made by the author in the taxicab business.—B. A.

TESTS FOR TRANSPORTATION PILOTS. *A. J. Snow. Abstr. from Jour. Applied Psychol., March, 1926, vol. 10, pp. 37–51, in Jour. Personnel Res., Aug., 1926, vol. 5, pp. 170–171.*

Tests are described which are used by the Yellow Cab Company at Chicago and elsewhere in rejecting unsuitable applicants, with a resulting decrease in accidents. Four major tests are used: physical examination, intelligence, emotional stability, and recklessness. The minor tests include muscular fatigue, muscular resistance, reaction time, and perception of space and motion.

VISUAL ACUITY AND COLOR PERCEPTION OF RAILWAY EMPLOYEES. *H. Reim. Am. Jour. Ophth., June, 1927, vol. 10, pp. 418–421.*

"The former neglect of visual tests for railway employees and the dangers of such neglect are indicated. A crude apparatus, for testing color perception, proved ineffective. A reexamination, with Ewing optotypes for vision and the Jennings test for color perception, showed a large proportion who had defective vision, among over five thousand men examined."

COLOR BLINDNESS IN INDUSTRY. *A. E. Chace. Jour. Am. Med. Assn., Oct. 16, 1926, vol. 87, pp. 1258–1261.*

The author believes that applicants for occupations requiring color perception should be tested only by one who has made a study of color sense and its pathology, and that the stations at which such tests are made should be reduced to the fewest practical number and the work at each checked periodically. Of ten groups of tests the group most commonly used is the worsted test; this test, however, according to the most experienced observers in Germany and England, fails to pick out about 50 per cent. of the dangerously color blind in marine and railroad service, and should, therefore, be discarded as the sole test of an applicant for train, yard, and engine service on railways. The Eldridge-Green type of lantern, used in conjunction with a simultaneous comparison test of the Stilling plate type, is advocated. Field tests, if used, should be conducted by experts, with specially constructed apparatus. For train, yard, and engine service, a man should see all the spectrum with the possible exception of orange, should not have a central color scotoma, and should not be markedly weak in any color, or be color ignorant or aphasic; shortening of the red end of the spectrum should be positively eliminated.—B. A.

AN EXPERIMENTAL STUDY OF A REPETITIVE PROCESS. *S. Wyatt. Brit. Jour. Psychol., 1927, vol. 17, pp. 192–209.*

Observations were made on thirty girls engaged in soap packing. The process consisted in wrapping and packing three tablets of soap in a cardboard box, and occupied about forty seconds. Five intelligence tests (opposites, analogies, mixed sentences, completing sentences, reasoning) were applied to each girl, and in addition an attempt was made to apply tests related to the particular capacities involved in soap wrapping. They were (*a*) a knotting test, in which the subject had to tie five knots on each of ten pieces of string, (*b*) a match-stick insertion test, (*c*) a tapping test, and (*d*) a touch discrimination test, in which five steel balls of slightly different sizes had to be sorted out five times. The working efficiency of the girls was based on the observed output over a period of eight weeks.

It was found that there was practically no relationship between intelligence and efficiency at soap wrapping, the coefficient of correlation being $+0.25\pm0.114$. There was likewise no relationship between the results of the manual tests of dexterity and efficiency, the correlation coefficient averaging $+0.06\pm0.13$. A modified form of the actual industrial process was then given as a test, the worker being requested to wrap fifty tablets

of soap as quickly as possible. The correlation coefficient was $+0.22 \pm 0.13$, so that even in this case it was not significant. In six operatives the time taken to complete each cycle of packing was noted continuously for four days, and the nature and duration of all stoppages were likewise recorded. It was found that the rate of working remained fairly uniform, but it was much prolonged whenever talking occurred; the most talkative operatives were also the most intelligent of the group, and they showed the most variation in their rate of working.

Systematic questioning of the girls indicated that, in general, variety in the form of activity and posture was preferred to uniformity in the industrial process. However, it was found that when the method of packing was altered to a more uniform system, by the use of a conveyor, the girls grumbled at first at the increased monotony of the work, but after two months' experience half of them said that they preferred it to the old method, as they had no lifting of heavy boxes, and no delay in the supply of soap or boxes.—H. M. V.

PSYCHIATRY IN MERCANTILE LIFE. *V. V. Anderson. Abstr. in Human Factor, Mass. Soc. Ment. Hyg., Jan., 1927, vol. 3, pp. 1–3.*

The importance of psychiatry in personnel problems in industry is here emphasized by the director of medical research at R. H. Macy and Company, New York. In this large department store the psychiatric method is applied to personnel problems under four main departments:

1. The Psychiatric Clinic: for the study of problem cases and promotional material within the store, referred by Management and Department Heads.
2. The Research or Survey Division: for conducting routine medical, psychiatric, social and psychological surveys of the employees, the jobs, and work conditions of any given department of the store.
3. A Testing Department: organized to serve the Employment Department in the way of routine psychological tests of all applicants for jobs.
4. Development of Interviewing Technique: for training interviewers, particularly in the psychiatric technique of employment.

—E. O.

MENTAL HYGIENE CONSIDERATIONS IN BUSINESS. *H. W. Stevens. Nation's Health, Feb., 1927, vol. 9, pp. 55–56.*

The health of a business is impaired by the mental and nervous disorders of the individual employees, whether in high positions or in low. Dr. Stevens therefore ventures the opinion "that nothing is so potent to improve the quality of a business as improved mental health in the high places."—B. A.

INDUSTRIAL SERVICE AND MUTUAL BENEFIT ASSOCIATIONS

INDUSTRIAL WELFARE WORK AT DAWSON. *P. K. Carson. Abstr. as follows from Southwest. Med., 1926, vol. 10, pp. 486–489, in Bull. Hyg., Aug., 1927, vol. 2, p. 634.*

Some description is given of activities in the "closed town" of Dawson, N. M., where mining is the only industry. Here all land and houses for a population of about 5,000 people belong to the operating Company. Problems of local government, streets,

lighting, water supply, sanitation, and so forth, are a part of the industrial operations. Readers' thoughts naturally revert to the activities of Robert Owen at New Lanark in 1800, to which, indeed, the author of the paper draws attention. A Welfare Committee takes the place of town government. The members are elected annually by ballot, and meet monthly to discuss community problems. Boy scout work is encouraged; and the lads have constructed for themselves an excellent building. Miners are generally a moving population; but much is being done to improve the surroundings of the houses by planting trees and encouraging home gardens. There is a division of social service which interests itself with such matters as child welfare, delinquency, and domestic relations. Health matters, such as the spread of infection due to the introduction of epidemic diseases like typhoid or measles, are handled by the Welfare Committee. The town is 35 miles from the office of the county health officer, but assistance is received from this source.

The water and milk are under the direct supervision of the Company, which maintains pure and wholesome supplies; while supervision is maintained through a subsidiary company over fruit, vegetables, and other foods. All persons selling food products must report at a central place at a designated hour, and have their meat, produce, or other foods inspected before they may offer them for sale.

MINERS' WELFARE FUND. FIFTH REPORT OF THE COMMITTEE APPOINTED BY THE BOARD OF TRADE TO ALLOCATE THE FUND, 1926. *H. M. Stationery Office, 1927, pp. 88.*

This Fifth Annual Report of the Miners' Welfare Committee brings the life of the Miners' Welfare Fund to the end of its experimental period. This fund was initiated six years ago, and is based upon a statutory levy of 1 penny on every ton of coal raised. The fund has an average annual income of about £1,000,000 and has to be devoted to the social welfare of coal miners. The success attendant upon this industrial experiment in welfare has led to the continuance, for a further five years, of the statutory levy, and also to further duties with regard to the establishment of pithead baths being intrusted to the Welfare Committee appointed to allocate grants from the fund. The story is told of how voluntary welfare committees have been brought into existence on each coal field, through which schemes of welfare for recreation, for establishing institutes, for setting up convalescent homes, for assisting hospitals, and for nursing and ambulance services are primarily initiated according to the requirements of the district. Such schemes, if approved, as they usually are, are then financed out of the Welfare Fund. One-fifth of the fund has remained in the hands of the Central Committee to use for such general purposes as research into safety and health, and for assisting the higher rungs of education for the mining community. At this stage excellent work has been done with a minimum cost for expenses of administration—indeed these have not reached 1 per cent. Details of an excellent scholarship scheme endowed by a sum of £150,000 are given; the scholarships are intended to

carry miners, their sons, or daughters, to a residential university.

A special feature of this report deals with plans for pithead baths. In addition to the levy already mentioned, the Committee are to receive a further sum of money from mining royalties, which is to be devoted to the construction of such baths. At first their experimental plants are to be erected on different coal fields in order to ascertain the best form to adopt. The plan so far approved differs from other efforts in this direction in that the section for clean clothes is kept separate from that for pit clothes, these two sections being separated by the bath section. Each man is to have two lockers, one for his ordinary clothes, and one for his pit clothes, which will be so warmed and ventilated as to dry wet garments placed within.

The report contains interesting illustrations of institutes erected, convalescent homes opened, laboratories for teaching, and plans for the layout of grounds for recreational purposes.—E. L. C.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

Several Important Questions in Accident Therapy. *G. Rosenburg. Zentralbl. f. Gewerbehyg., Oct., 1926, N.S. vol. 3, pp. 275–283.*

The writer refers to the more favorable provisions for the injured in the new law of 1925 and emphasizes the importance of "roentgen control" in cases of industrial accident. Considerable space is given to details and statistics of specific injuries about the shoulder, the arm, the fingers, the knee, etc., and the importance of functional treatment is stressed.

The debated question, whether or not intestinal ruptures can be brought about by accident and whether or not they should be compensable, is discussed. The author is of the opinion that very few of these cases are really caused by accident, but that most of them are rather the results of congenital conditions. The conditions governing the decision whether or not accident is the cause in any given case of sickness are also discussed at length, and the importance of obtaining satisfactory proof as well as of reporting all accidents immediately and accurately is emphasized. The connection, if any, between tuberculosis, osteomyelitis or malignant tumor and accident is considered. It has been frequently shown that the accident was not the cause of the affliction itself but merely of the discovery of the affliction.

The writer observes that the injured workman has usually found himself fit for the resumption of his regular occupation immediately after the insurance settlement. This observation is expanded, together with its relation to the compensation provided by the old and the new laws, by private companies, and by the unions.

Accident therapy, as the youngest branch of medicine, has accomplished much. Close co-operation with other branches, especially with related surgery and orthopedics, and with insurance and industrial hygiene will, it is hoped, lead to new results in the fight against disease and the consequences of accident.—A. W. N.

REGULATIONS FOR THE PROTECTION OF WOMEN AND YOUNG PEOPLE EMPLOYED IN CERTAIN KINDS OF WORK. *E. Meyer. Zentralbl. f. Gewerbehyg., Dec., 1926, N. S. vol. 3, pp. 340–342.*

The author has assembled the various Regulations which have been issued governing the employment of women and young people in hazardous occupations.—M. C. S.

PROGRESS IN COMPENSATION FOR CHILDREN INJURED WHILE ILLEGALLY EMPLOYED. *Am. Labor Legis. Rev., Dec., 1926, vol. 16, pp. 280–281.*

Double compensation for illegally employed minors has already been adopted in four states: Wisconsin in 1917 provided for treble compensation for minors injured while illegally employed and subsequently changed this provision to double compensation for minors illegally employed and treble compensation if the injury occurred in a prohibited employment. New York and New Jersey provide for double awards for minors employed illegally; and Indiana provides double compensation, with certain limitations. In addition to these four states, Oregon has provided that when children illegally employed are injured, the employer must pay into the state fund a penalty equal to 25 per cent. of the compensation, but not exceeding $500. —B. A.

ACCIDENTS COMPENSATED IN YEAR ENDED JUNE 30, 1925. A—COST OF COMPENSATION. *N. Y. State Dept. Labor, Special Bull. No. 146, 1926, pp. 67.*

COMPENSATION STATISTICS YEAR ENDED JUNE 30, 1926. *N. Y. State Dept. Labor, Special Bull. No. 148, 1927, pp. 59.*

COURT DECISIONS ON WORKMEN'S COMPENSATION LAW, JANUARY-DECEMBER, 1926: ALL SUBJECTS. *N. Y. State Dept. Labor, Special Bull. No. 149, 1927, pp. 312.*

SURGERY AND THE WORKMEN'S COMPENSATION ACT. *Brit. Med. Jour., Oct. 30, 1926, vol. 2, pp. 787–788.*

Tracing the history of workmen's compensation acts from 1846 to the new consolidating Act of 1925, Mr. V. Warren Low showed the development of the present provisions. Owing to the number of cases which have been decided in the courts and to the medical knowledge now available, the legal position of any plaintiff, save in a few exceptional cases, is perfectly clear provided the facts are proved. There still remain, however, points on which it might be difficult to reach a decision, such as duration of incapacity, cases involving diseases of the nervous system with the possible complicating factor of malingering, cases of osteo-arthritis apparently induced by an injury, and the length of time which should elapse before a man who had sustained a fracture, particularly of the lower limb, might return to work. He emphasized that "the conditions of industry would seem to require, in addition to the use of ordinary hospitals, some after-care centres where, by constant supervision and encouragement, men who had been discharged from hospital might be induced to overcome their lack of faith in their own restored powers."—B. A.

A Law Pertaining to Occupational Accidents in Hospitals. *Paris Letter, Jour. Am. Med. Assn., Feb. 26, 1927, vol. 88, p. 660.*

There are numerous cases in which interns and nurses have been the victims of accidents occurring in the performance of their regular duties, but neither they nor their families have received compensation because the law pertaining to occupational accidents applies only to manual workers. After twenty-five years of effort, the chamber of deputies has finally been induced to accept legislation that protects scientific workers. The bill as passed by the house comprises four sections, and applies to accidents befalling the technical personnel of hospitals, including physicians, surgeons, alienists, roentgenologists, heads of clinics and laboratories; assistants of physicians, surgeons, and specialists; interns and externs, pharmacists, dentists, students, midwives, nurses (both sexes), and all other technical employees, and allows them, in case of occupational accident, either temporary or permanent compensation, and free hospital treatment. Occupational diseases contracted while on duty entitle the claimant to the same compensation as accidents properly so called. Accidents that supervene which are more remotely connected with the performance of one's regular duties will even be considered. . . . . A commission on which will be represented the various professions and callings cited above will establish, for the ministry of labor, the salary schedule that shall serve as a basis for the determination of the compensation to which each class of hospital employee is entitled..... Undoubtedly the senate will ratify the terms of this just law.—K. R. D.

The Duty of Reporting Occupational Diseases from the Standpoint of the Practising Dermatologist, with Special Regard to Occupational Eczema. *C. M. Hasselmann. München. med. Wchnschr., Sept. 10, 1926, vol. 73, pp. 1523–1526.*

The author discusses the shortcomings of the ordinance of May 12, 1925, from the standpoint of the dermatologist. The great mass of cases of industrial eczema are not reportable and consequently are without compensation. Various authors are quoted regarding cases not to be reported, regarding the impossibility of accurately distinguishing between exogenous and endogenous dermatosis, and regarding the part that idiosyncrasy plays in cases of eczema, etc.

From the standpoint of the ophthalmologist, Wick is quoted as making criticisms similar to those of the dermatologist.—A. W. N.

Indemnity Neurosis. *K. Mendel. Abstr. as follows from Med. Klin., Nov. 19, 1926, vol. 22, p. 1807, in Jour. Am. Med. Assn., Feb. 26, 1927, vol. 88, p. 686.*

Mendel was asked to give his expert opinion on the advisability of a paid trip into the country for a 69-year old former engineer who had suffered a slight injury thirty-four years before. Ever since the injury the well-preserved man had been getting a 66 per cent. pension besides extra allowances for visits to bathing resorts. The expert advised strongly against granting any additional allowances for treatment of the sequelae of his injury, since

there never were such sequelae. On the other hand, he did not recommend discontinuance of the annual indemnity, because the man had lost his ability to earn a living by his decades of lazy life—mainly through the fault of his former physicians.—K. R. D.

THE "SO CALLED" TRAUMATIC NEUROSES. *L. Heidrich. Beitr. z. klin. Chir., 1926, vol. 137, p. 623.*

DECISIONS IN CASES OF GAS POISONING. *F. Flury. Abstr. from Deutsch. Ztschr. f. d. ges. gerichtl. Med., 1926, vol. 7, no. 2–3, in München. med. Wchnschr., Dec. 17, 1926, vol. 73, p. 2179.*

With most gaseous poisons the mode of action depends on the concentration; for example, halogen containing aldehydes and cyanogen compounds in weak concentrations act like irritant gases and in strong concentrations like narcotics. With irritant gases the effect depends on the concentration and the period of inhalation. Decisions in cases of gas poisoning are often very difficult; chemical proof in the body is generally not feasible. This is true especially of mixed gases. Cases of chronic gas poisoning are frequently obscure. In most cases of poisoning with irritant gases changes occur in the respiratory tract, especially edema of the lungs with secondary cardiac weakness. Most cases recover without any sequelae; there has been no evidence of aggravation of pulmonary tuberculosis. Through swallowing, gastric disturbance may be brought about. Manifestations of disturbances of the central nervous system are secondary to disturbances of the circulation. Injuries to the liver depend for the most part on special predisposition.—M. C. S.

GENERAL EXPERIENCES IN INSURANCE MEDICINE IN THE TREATMENT OF INDUSTRIAL POISONINGS, THE PROBLEMS, AND THE DIFFICULTIES. *H. Zangger. Abstr. from Klin. Wchnschr., April 2, 1926, vol. 5, pp. 612–617, in München. med. Wchnschr., Dec. 17, 1926, vol. 73, p. 2179.*

On the basis of long experience in Switzerland, where industrial diseases have been on an equal footing with accidents since 1887, the author discusses the German order of May 12, 1925, and emphasizes the frequent occurrence of incorrect diagnoses and the more frequent omission of symptoms. The physician has been accustomed in the past to give a pathologic-anatomic diagnosis, not an etiologic diagnosis. The German legislator endeavored to lessen the difficulties by limiting the order to a small number of diseases and by the introduction of "qualified" physicians. For the execution of the order it would be very helpful if an opportunity were given to practical physicians to obtain information from specialists with regard to pertinent questions.—M. C. S.

THE CHIROPRACTOR AND INDUSTRIAL MEDICINE. *D. H. Gibson. Boston Med. and Surg. Jour., Feb. 3, 1927, vol. 196, pp. 184–185.*

In industries where there are relief benefits, the employee's rights may be jeopardized by seeking the service of either an osteopath or a chiropractor. A specific case is cited of an employee residing in another state who was treated for influenza by a chiropractor

duly registered in that state, the chiropractor furnishing the employee with a certificate to substantiate his claim for relief benefits. According to the rules of the benefit association "production of satisfactory proof or medical certificate" was called for. It was ruled, in accordance with the act regulating the practice of chiropractic in that state, that the certificate was not furnished by a duly licensed physician.—B. A.

REHABILITATION OF DISABLED EMPLOYEES

EMPLOYMENT PRACTICE FOR THE DISABLED. *D. Ritter. Abstr. from Thumbs Up, April, 1926, vol. 8, nos. 2-3, in Occup. Therapy and Rehabilitation, Aug., 1926, vol. 5, pp. 313–315.*

The Employment Bureau of the Institute for Crippled and Disabled Men has had nine years of experience in placing disabled men in jobs. It has learned, by placing one cripple on a job and having him hold it successfully over a period of time, what another cripple with a similar disability may be capable of doing. It has found that the one-armed cripple, as a rule, does very well at painting; that men with serious hand injuries and partial amputations have succeeded in welding. In a case of leg amputation, an effort is made to persuade the man to wear an artificial leg, because crutches will keep him out of a job before he gets inside the door; with an artificial leg, experience has proved that he is the least disabled of all cripples.

Those disabled through infantile paralysis are encouraged to continue in school and get as much education as possible; then they are placeable in clerical work.

No cardiac is placed without a cardiac classification. Cardiac defectives placed in jewelry lines and in the pocketbook trade have done well; switchboard work is especially suitable.—B. A.

THE REEDUCATION AND REHABILITATION OF THOSE ACCIDENTALLY INJURED AT WORK. *G. Ichok. Ann. d'hyg. pub., indust. et sociale, 1927, vol. 5, pp. 23–29.*

A plea is put forward for reeducating and rehabilitating those accidentally injured at work. Schemes adopted on behalf of wounded soldiers exhibited what is possible, and should be continued for those injured in peace time. A short summary is given of governmental action being taken in this matter in the United States, Germany, Austria, Belgium, Spain, France, Italy, and Holland. The author holds that compensation law should provide for occupational reeducation, pointing out that the problem of the injured is not a negligible part of public health.—E. L. C.

CURED OF TUBERCULOSIS AND BACK ON THE JOB AGAIN. *R. R. Rosell. Nation's Health, Jan., 1927, vol. 9, pp. 25–26.*

The Hennepin County Tuberculosis Association, Minneapolis, Minn., has organized a placement bureau for its ex-patients. In general, the tuberculous adult is advised to seek employment in some occupation in which he has knowledge and skill

gained through previous experience, unless he developed the disease in work hazardous for him, or where hazardous conditions are tolerated. Effort is made to induce the employers to receive back their employees who have undergone treatment and become arrested cases.—M. M.

INDUSTRIAL MORTALITY AND MORBIDITY STATISTICS

AN INQUIRY INTO THE MORBIDITY AND MORTALITY STATISTICS OF THE EMPLOYEES OF THE NEW SOUTH WALES GOVERNMENT RAILWAYS AND TRAMWAYS DURING THE YEAR 1924 AND OF THE VICTORIAN GOVERNMENT RAILWAYS DURING THE YEARS 1922, 1923 AND 1924. *Abstr. as follows from Commonwealth of Australia, Dept. Health, Ser. Pub. (Div. Indust. Hyg.) No. 3, 1926, pp. 52, in Bull. Hyg., May, 1927, vol. 2, p. 427.*

The Commonwealth Department of Health has conducted several investigations into the sickness experience of various government services. The object of these inquiries is to obtain standards of comparison between the various occupational groups and to determine whether the sickness incidence is excessive in any particular group. Full details are given of the system used in recording sickness and of the method of dealing with the statistical records.

The employees in the two groups studied in this report numbered over 65,000. The sickness experience was practically the same in both groups. Excluding absences due to external causes and those in which the duration of sick leave did not exceed 3 days, the average number of days sick leave in 1924 was 3.24 among the New South Wales Railway employees and 3.86 among the Victorian employees. Influenza was responsible for the largest incidence rate, 62.9 cases per 1,000 employees in the New South Wales group (1924) and 63.1 in the Victorian (mean 1922 to 1924). Diseases of the digestive system ranked next in order of severity with incidence rates of 43.6 for New South Wales and 39.2 for Victoria.

The mortality experience of the two groups was slightly higher in New South Wales, 3.7 per 1,000 employees (1924) against 3.3 in the Victorian group (1922 to 1924).

In the appendix the tables are given on which these results are based.

A STUDY OF OCCUPATION AND DISEASE BASED ON HOSPITAL RECORDS. *E. H. Lewinski-Corwin. Nation's Health, Jan., 1927, vol. 9, pp. 34–37, 80.*

The Hospital Information Bureau of the United Hospital Fund has here further analyzed data bearing on morbidity rates of patients in New York City. (For preliminary report see THIS JOUR., 1926, vol. 8, p. 270.) The workers in each occupation were divided into three age groups for purposes of comparison.

Appendectomies and tonsillectomies were found to be the two chief causes of hospitalization in the "office clerk" group, the largest unit studied, whereas injuries and alcoholism headed the list among outdoor laborers. Factors other than those of occupation and age have to be taken into considera-

tion, such as the standards of living, the economic status, the racial distribution, and the extent to which individuals already below par enter one occupation as compared with another, before any deductions can be drawn from a comparison of the morbidity among these different groups of workers.—M. M.

A 10-YEAR RECORD OF ABSENCES FROM WORK ON ACCOUNT OF SICKNESS AND ACCIDENTS. EXPERIENCE OF EMPLOYEES OF THE EDISON ELECTRIC ILLUMINATING CO. OF BOSTON, 1915 TO 1924, INCLUSIVE. *D. K. Brundage. U. S. Pub. Health Rep., Feb. 25, 1927, vol. 42, pp. 529–550.*

The following points were brought out by an analysis of the records of the Edison Electric Illuminating Company of Boston for the period 1915 to 1924, inclusive:

1. The toll of sickness and accidents was equivalent to an annual experience of 8.9 calendar days of disability per male, and 14 calendar days of disability per female on the payroll.

2. Among the men, sickness caused twelve times as many absences as did industrial accidents; among the women the ratio was 171 sicknesses to one industrial accident.

3. Respiratory diseases caused approximately 50 per cent. of all the absences and 40 per cent. of all the time lost on account of sickness among the men. The percentages for respiratory diseases among the women were not quite so high.

4. Colds and other diseases of the nasal fossae incapacitated, on the average, four out of ten men annually and seven out of ten women; the days of disability were equivalent to 1.4 per year per man and 2.1 per year per female employee.

5. There were 202 absences from sickness, exclusive of accidents, among the women to every 100 absences among male employees, after adjusting for differences in the age distribution of the two sexes.

6. The frequency of absence for one day or longer on account of sickness decreased as age advanced among persons of either sex, but the duration of incapacitation definitely increased with age, especially in the higher age groups.—M. C. S.

ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE

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GENERAL

HANDBOOK OF LABOR STATISTICS, 1924–1926. *U. S. Bur. Labor Statistics, Bull. No. 439, June, 1927, pp. 828.*

This handbook brings together, in convenient form for reference purposes, digests of the material published by the Bureau of Labor Statistics, in its bulletins and in the *Monthly Labor Review*, of sufficiently recent date to be of present day interest and value. Of interest to industrial hygienists are the sections on child labor, industrial accidents, industrial diseases and poisons, insurance and benefit plans, physical examination of workers, sickness statistics, women in industry, workmen's compensation, and wages and hours of labor.—M. C. S.

SEVENTH ANNUAL REPORT OF THE INDUSTRIAL FATIGUE RESEARCH BOARD TO 31ST DECEMBER, 1926. *H. M. Stationery Office, 1927, pp. 28.*

A summary is given of work completed and in progress in the year under review. The comprehensive analysis issued in the sixth annual report makes more unnecessary. Researches into the use of rest pauses and into the personal factor in accident causation are the most important of work done. The program ahead is extensive and includes studies of age of entry into industry, sickness in weaving sheds and in printing, weight lifting and load carrying, atmospheric conditions in mines, and vision and

illumination. The Board again expresses its faith that what is advantageous to human environment in occupation proves advantageous to industrial economics, and urges industries to assist more closely in advancing progress.—E. L. C.

SAFETY IN MINES RESEARCH BOARD. FIFTH ANNUAL REPORT FOR 1926. *H. M. Stationery Office, 1927.*

The Fifth Annual Report of the Safety in Mines Research Board deals with the year 1926, which saw the virtual completion of the new Research Station for large scale experiments at Buxton and the commencement of the building of the Board's new laboratories at Sheffield. The Board's annual expenditure (mainly derived from the Miners' Welfare Fund) remained at about £50,000. As in previous years, the report is mainly devoted to brief accounts of the progress of the numerous researches which are being carried out either directly under the Board or committees of the Board, or at universities and other centers with the aid of funds supplied by the Board. The subjects of research included problems relating to coal dust explosions, firedamp explosions, spontaneous combustion of coal (including the treatment of gob-fires), the safe use of electricity in coal mines, mining explosives, safety lamps, devices for trapping dust generated by rock drills, devices for winning coal without explosives, falls of ground, wire ropes, and the control of mine temperatures. New researches were begun under several of these heads. Thirteen reports were published by the Board during the year, and a list is given of many other papers relating to the researches written by members of the staff and published in scientific journals, etc.

The report also embodies an account of the progress of the health inquiries carried out under the supervision of the Health Advisory Committee, notably the inquiries with regard to the injurious effects of certain rock dusts.

HEALTH SURVEY OF THE PRINTING TRADES, 1922 TO 1925. *F. L. Hoffman. U. S. Bur. Labor Statistics, Bull. No. 427, March, 1927, pp. 149.*

The author has here compiled information obtained from personal inspection of plants and from questionnaires sent to employers and to labor organizations. Returns were received from 2,096 employers, covering approximately 100,000 employees. They showed 697 employees absent on account of sickness, only thirty-four known cases of lead poisoning, seventy-eight cases of tuberculosis, and sixty-seven cases of eye affections. Replies to the questionnaire sent to labor organizations confirmed the reports of employers as to the low sickness rate in the industry, as well as to the low incidence of lead poisoning. Occasionally, however, they showed that sanitary conditions were in need of improvement.

Physical and medical examinations brought out a fairly common occurrence of visual defects, probably in many cases due to ill-adjusted posture. Periodic eye examinations are, in the author's opinion, urgently called for.

Such investigations as were made seem to show that conditions as to dust and ventilation in most modern printing plants are at least reasonably satisfactory.

Special consideration was given to both lead poisoning and tuberculosis.

The results show that chronic lead poisoning, while always a grave potential danger, is now, at least in fatal form, of minor importance, and that tuberculosis has not at present the significance attached to it which it had in former years. The author emphasizes, nevertheless, the necessity for taking every precaution.

An attempt was made to ascertain the extent of occupational skin disease among printers, but the results were inconclusive. It is quite probable that such affections are fairly common in certain highly specialized occupations of the printing trades but they are not of very serious significance in their bearing on the general health of printing plant employees.

In general, the observations made indicate a satisfactory state of health in the printing trades, suggestive of very material progress in sanitary conditions and the control of conditions likely to give rise to objectionable features bearing on health and longevity. The author suggests that if such a survey were continuous it would reveal the trend or the tendency toward better or worse with reasonable accuracy, and it is his hope that further investigations will be authorized by the various interests concerned.

Copies of the various questionnaires are shown in Appendix A. Appendix B presents a list of precautions necessary to safeguard the health of printers.—M. C. S.

INDUSTRIAL PHYSIOLOGY: NUTRITION, METABOLISM, FATIGUE, ETC.

THE EFFECT OF EYESTRAIN ON THE OUTPUT OF LINKERS IN THE HOSIERY INDUSTRY. *H. C. Weston and S. Adams. Indust. Fatigue Res. Board, Rep. No. 40, pp. 17. H. M. Stationery Office, 1927.*

The subject of illumination in industry continues to receive attention, and the report under notice brings out a new aspect. Where details are fine, illumination, however high, does not eliminate the necessity for near vision with excessive accommodation and convergence. Relief may be secured by using suitable magnifying glasses and prisms. The process of linking in the hosiery trade consists of closing, by two rows of stitches or loops, a gap left across the toe portion, as hose comes off from the knitting machine. It is done by machine, but calls for close and fatiguing eye work. Eyes of the operatives so employed were carefully examined and they were provided with suitable magnifying lenses; no prisms were used in this inquiry. In no case did the operative need lenses for ordinary vision.

The output of three operatives was observed for a period of four weeks before they were examined and fitted with the glasses. Their output was again recorded after they had received their glasses. The results are given in tables and in diagrammatic form. Considerable saving in time was effected and the average hourly output was increased for each of the workers. At the end of the experimental period, the subjects were allowed to retain their glasses, which they have continued to wear, with considerable pleasure and advantage to themselves.—E. L. C.

REST-PAUSES IN INDUSTRY. (A REVIEW OF THE RESULTS OBTAINED.) *S. Wyatt. Indust. Fatigue Res. Board, Rep. No. 42, pp. 21. H. M. Stationery Office, 1927.*

A useful review is presented of evidence drawn from many sources bearing on the value of rest pauses in industry. Rests are found to be particularly beneficial when production is largely dependent on the activities of the worker, rather than on the mechanical element. They are also of benefit when the natural rhythm of the body cannot be maintained or is interfered with during activity. The expectation of a rest has been noted to exert a beneficial influence on output even before the rest comes. Close study is, however, needed for scientific use of rest pauses. First, a typical curve of output should be obtained, and then a rest should be introduced at the moment when the rapidity of output usually commences to fall away. Different processes and different individuals call for special consideration. Rest pauses have been found to benefit most those workers whose output is least satisfactory. In some cases, a combination of teamwork with rests has been found advantageous to the output of machines, which might otherwise have been left standing unused for a time.

Reading this report indicates how complex is the whole subject of rest pauses in industry, but also shows how valuable an instrument rest pauses may be for increasing production, and for minimizing, or rather postponing, the onset of lessened activity.—E. L. C.

REST PAUSES IN HEAVY AND MODERATELY HEAVY INDUSTRIAL WORK. *H. M. Vernon, T. Bedford, and C. G. Warner. Indust. Fatigue Res. Board, Rep. No. 41, pp. 21. H. M. Stationery Office, 1927.*

Rest pauses have previously been investigated in light repetitive work, rather than at heavy physical labor. Advantage has been shown to accrue to the rate of output and to the postponement of tiredness, by the interposition of short recognized pauses. The present report gives instances of rest pauses in heavy industrial work. The investigators report that at such work the men are found taking rests voluntarily and, at such diverse occupations as road making, shoveling sand, and dock work, they tended to rest for a little over one minute and to take such intervals fairly regularly after about six minutes' activity. The rhythm of the rest pauses and of their length was most pronounced when the work was regular. Where different movements and actions have to be performed, the rhythm was too broken to be manifest. Workers paid by time tended to take rather more rest periods than those paid piece rates. But speaking generally, the greater the call for energy at work, the longer and more frequent were the rest pauses taken. Evidence is presented from agricultural occupations, road making, building, dock labor, boot and shoe making, loading pitch, coal mining, and rolling tin plates, all of which call for considerable expenditure of physical energy. The conclusion would appear to be that there is little need for interposing organized rest pauses for heavy labor in the same way that has been recommended for light repetitive work. The workers naturally take their own pauses and take them in such a way as to get for themselves the maximum of benefit. At any

rate no suggestions are put forward, or experiments quoted, of attempting to organize such pauses in heavy work.—E. L. C.

INDUSTRIAL SANITATION: FACTORY CONSTRUCTION, ILLUMINATION, VENTILATION, HEATING, WATER SUPPLY, SEWAGE DISPOSAL

INDUSTRIAL AIR CONDITIONING BY THE UNIT SYSTEM.

A recent achievement in the field of heating and ventilation is the development of the unit air conditioning system, which is introduced by the York Heating and Ventilating Corporation of Philadelphia.

The equipment is designed primarily for industrial plants which manufacture, use, or store hygroscopic materials, where it is highly desirable to maintain a certain definite air temperature and humidity. It is especially well adapted for use in small factories, where the cost of central air conditioning has been prohibitive.

This unit system is simple, compact, and much less costly than the central system used heretofore. The unit is simply set on the floor, the steam, water, and electric lines connected to it, and the automatic controls fixed at the desired points. The temperature, humidity, and air circulation in the room will then be automatically maintained within narrow limits.

The apparatus operates, briefly, as follows: The incoming air is passed successively through two spray chambers where its moisture content is regulated by the automatic control. It then passes over a series of eliminator plates which remove suspended moisture. Thence the air comes in contact with heating coils which raise its temperature to the degree at which the thermostat is set. Finally, a pair of fans discharge the conditioned air through outlets into the room above the heads of the workers.

If the air is to be cooled and dehumidified, the circulating water pump is connected to a cold water supply. The air can then be cooled and its excess moisture condensed by contact with the cold spray as the air passes through the spray chamber.

Air conditioning units are now available in capacities ranging from 750 to 10,000 cubic feet of air per minute. In the opinion of the writer, this new equipment will find an application not only in the industrial field but also in experimental work and in the premature nurseries of hospitals, although for the latter purpose some modifications will be necessary.—C. P. Y.

INDUSTRIAL PSYCHOLOGY AND INDUSTRIAL MANAGEMENT IN ITS HEALTH RELATIONS

PSYCHOLOGY IN ITS VOCATIONAL APPLICATION. A SURVEY OF RECENT LITERATURE. *D. Fryer. Ment. Hyg., Jan., 1927, vol. 11, pp. 124–139.*

Representative publications are summarized that have appeared in various fields of applied psychology, notably industrial psychology, vocational guidance, and employment psychology.

THE PSYCHOLOGICAL VERSUS THE PSYCHIATRIC METHOD IN INDUSTRY. *E. L. Ray. Ment. Hyg., Jan., 1927, vol. 11, pp. 140–147.*

Dr. Ray compares mental ability to the engine in an automobile, adding that "it is necessary to have not only an engine, but a driving force behind it to make it go." The psychologic method as measuring the possession of intelligence and mental ability does not go far enough; the psychiatric method, in measuring the ability to use efficiently the mental qualities possessed, probes more deeply into the individual characteristics and problems. Five cases are cited to show that psychological tests should be considered only as part of the picture that the psychiatric method of study gives of a worker.—B. A.

INTELLIGENCE IN LABOR TURNOVER IN THE TAXICAB INDUSTRY. *A. J. Snow. Indust. Psychol., April, 1927, vol. 2, pp. 191–195.*

Definite employment standards based on careful and broad study over a long period of time of conditions under which men work and of causes of labor turnover provide the most scientific way in which to hold men in employment.—B. A.

TRANSPORTATION SAFETY BY SELECTION AND TRAINING. *M. S. Viteles. Indust. Psychol., March, 1927, vol. 2, pp. 119–128.*

Selection of drivers through analysis of individual differences in accuracy and certainty of response under the complex distracting conditions of the street should be supplemented by improved training in the formation of right and safe habits.—B. A.

AN INVESTIGATION OF CERTAIN PROCESSES AND CONDITIONS ON FARMS. *W. R. Dunlop. Nat. Inst. Indust. Psychol., Rep. No. 2, 1927, pp. 71.*

This report describes the result of an investigation made in the months of July to September at a number of farms. It was confined to observations on the picking and packing of fruit and on the milking of cows. It was found that the best pickers of one kind of fruit are the best pickers at all other kinds of fruit, some pickers being nearly four times as fast as others. Methods are suggested for accelerating the rate of slow pickers; *e.g.*, by using both hands for picking and by keeping the receptacle as near to the bush as possible. A simple stool was devised which afforded a comfortable seat at three different heights. The packing of bush fruit into small baskets was usually done on the ground. By substituting a bench, a saving of 23 per cent. was effected in the packing time, and there was a great reduction of fatigue. In the packing of tomatoes, a complete rearrangement of the work was recommended, involving "departmentalization." It was found that in some glass houses and packing sheds the unproductive time might amount to considerably more than half the total time. The reasons of this waste were identified and found to be largely preventable.

In the milking of cows, it is found that a good deal depends on the manual skill of the milkers, while the ease of milking varies greatly in different cows. The rate of milking of "easy" cows is two or three times greater than that of "hard" cows, and

it is suggested that hard cows should be got rid of, as their defect is congenital. The ordinary milking stool is unsatisfactory, as it is not adjustable in height.

It is suggested that observations of a similar kind ought to be made in a number of farms in different parts of the country, and that they should be extended to many other processes such as hoeing and planting cabbages, and harvesting wheat. Results of far-reaching importance might be secured by the application of methods of vocational selection and guidance to agriculture.—H. M. V.

INDUSTRIAL HEALTH LEGISLATION: COURT DECISIONS: WORKMEN'S COMPENSATION AND INSURANCE

The Compulsory Notification of Occupational Diseases. *Paris Letter, Jour. Am. Med. Assn., April 2, 1927, vol. 88, p. 1092.*

A new decree in the *Journal officiel* contains the list of occupational diseases that physicians are obliged to report in view of the proposed extension of legislation pertaining to occupational accidents. The benefits of the law will accrue to victims of various affections some of which are as follows: diseases caused by lead, mercury, and their compounds; aniline and its derivatives; carbon disulphide; chlorine and bromine, hydrofluoric acid, sulphur dioxide, hydrogen sulphide and ammonium sulphide, hydrocyanic acid, carbon monoxide, carbonyl chloride (phosgene), formaldehyde; white phosphorus and hydrogen phosphide; arsine and other compounds of arsenic; pitch, tar, mineral oils, cements, lime and other caustic substances; chromic acid and alkali chromates, and roentgen rays and radioactive substances.—K. R. D.

Industrial Accident and Invalidity Insurance Law. *Leymann. Abstr. from Zentralbl. f. Gewerbehyg., Feb., 1927, N. S. vol. 4, pp. 53–55, in Bull. Hyg., Aug., 1927, vol. 2, pp. 631–632.*

Altogether 3,847 cases were reported (2,484 by medical practitioners). Of the notifications 537 were rejected as not notifiable, and in 891 (including the above 537) no industrial disease was involved; 39 were sudden occurrences and, therefore, should have been treated as accidents; 144 were one or other of the diseases named, but had occurred in industries which were not scheduled; in 18 cases the patient was not an insured person; in 178 the date had not been properly given; in 1,508 the malady was cured before the claim for compensation arose; 165 cases received compensation; 344 were settled without the need for a decision; and 560 remained for settlement in the following year.

Five cases were fatal, 31 led to complete and 113 to partial incapacity.

The total sum expended by insurance carriers for compensation, pensions, etc., amounted to 119,762 marks [about £6,000].

Experience with Industrial Disease Insurance during the First Year of Operation. *Koelsch. München. med. Wchnschr., March 25, 1927, vol. 74, pp. 496–497.*

In addition to the material presented in Leymann's paper which is reviewed in the preceding abstract,

Koelsch gives an analysis of the 186 cases reported from Bavaria. These were distributed according to cause as follows: lead, 153 cases; mercury, 7; arsenic, 10; carbon disulphide, 2; benzol, 3; aromatic nitro and amido compounds, 3; roentgen rays, 4; other radiations (glass blowers' cataract), 4.

FACTORY AND WORKSHOP. WELFARE. THE BAKEHOUSES WELFARE ORDER, 1927, DATED FEBRUARY 26, 1927. *Statutory Rules and Orders, 1927, No. 191, pp. 2. H. M. Stationery Office, 1927. Abstr. as follows in Bull. Hyg., June, 1927, vol. 2, p. 500.*

This is a very valuable Order which calls for the provision of washing facilities for those who handle dough, or the ingredients of bread or flour confectionery.

The occupier is also required to provide and maintain, for use of all persons employed in the bakehouse, suitable accommodation for clothing put off during working hours with arrangements for drying clothing if wet.

The occupier is also required to display the official cautionary notice regarding the prevention and cure of dermatitis among workers handling flour and sugar, and must make arrangements for providing first aid treatment of injuries. Drinking water must be supplied at adequate points in the bakehouse.

LEAD PAINT DANGERS. *London Letter, Jour. Am. Med. Assn., April 2, 1927, vol. 88, p. 1090.*

The Home Secretary in a circular draws the attention of all master painters, master builders, and others employing persons in painting buildings to the requirements of the Lead Paint Act, which comes into force January 1. The Act makes it the duty of every person who employs other persons in painting buildings, whether he uses lead paint in his work or not: (1) to send to the factory inspector for the district a written notice stating his name and the address of his office; (2) to keep a register of the persons employed by him in the painting of buildings and the work on which they are employed; and (3) if any case of lead poisoning occurs among his employers, to notify it at once to the factory inspector and certifying surgeon. The Act empowers the Home Secretary to make regulations for preventing danger from lead paint to persons employed in, or in connection with, the painting of buildings, and draft regulations for this purpose are about to be issued. The Act also prohibits (after Nov. 18, 1927) the employment of women or young persons under 18 in painting any part of a building with lead paint. This prohibition, however, does not apply to any woman who was employed at the time the Act was passed in some employment which included the painting of buildings with lead paint, nor to any young person employed as an apprentice in the painting trade under arrangements approved by the home office.—K. R. D.

AN ACT TO MAKE BETTER PROVISION FOR THE PROTECTION AGAINST LEAD POISONING OF PERSONS EMPLOYED IN PAINTING BUILDINGS. LEAD PAINT (PROTECTION AGAINST POISONING) ACT, 1926. [16 & 17 GEO. 5. CH. 37]. *H. M. Stationery Office, 1926, pp. 4.*

SUBJECT INDEX TO VOLUME IX

This is a subject index to all the reading matter in the ABSTRACT OF THE LITERATURE OF INDUSTRIAL HYGIENE, and one should, therefore, look for the subject word. The name of the author follows the subject entry in parenthesis.

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